SF369
.C57

The Citrus Industry

Representative of Every Interest

Representing No Special Interest

CLEMSON COLLEGE LIBRARY
DEC 12 1960
AGRI. REF. DEPT.

In This Issue:

Citrus Yield Per Tree Per Acre

A Comparison Of Magnesium Sources In Young Orange Trees

24-County Report On Conditions of This Season's Citrus Crop

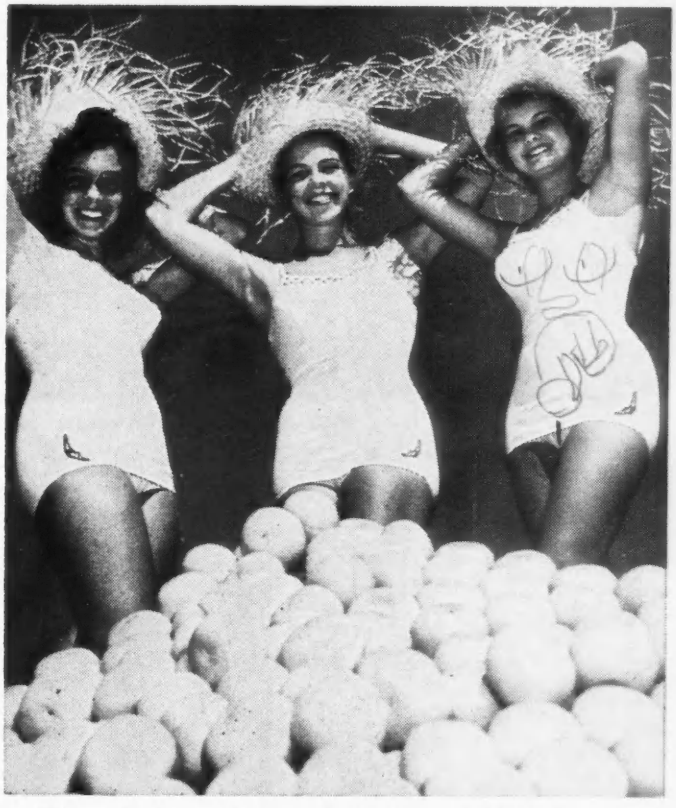
Citrus Plant Breeding— A Fascinating And Profitable Venture For Citrus Growers

Research Planning In Responses Of Valencias To Microclimate, Particularly Temperature

Single Copy ..... 15 Cents

Subscription
$1.00 Per Year In Continental U. S.
$2.50 Per Year Outside

CITRUS CUTIES



With Florida's first grapefruit crop of the season hitting the Northern market, these Aquamaids take time out from their ski shows to pose for pretty picture with the vitamin-filled fruit. They are, left to right, Barbara Arwood of Orlando, Jan Hogennauer of New York, and Ann Tucker of Winter Haven.

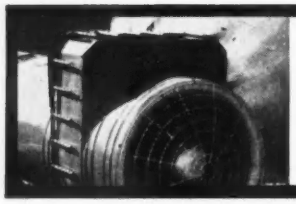
VOL. 41 — NO. 12 DECEMBER, 1960 BARTOW, FLORIDA

John BEAN SPEED SPRAYERS

FIRST IN **PERFORMANCE • FEATURES • FLORIDA**

FLORIDA BUILT FOR FLORIDA GROVES

Effective grove protection depends *not only* upon air volume, but also upon air handling and direction control. Speed Sprayer gives you all three . . . skillfully engineered for thorough, penetrating tree coverage even in critical dense areas in the topmost center branches. Experience is partial proof of Speed Sprayer superior performance — John Bean engineers have pioneered and developed air handling since the late 30s. For final proof, ask grove owners who use Speed Sprayers to protect almost 85% of Florida's commercial citrus acreage! Ask us for demonstration proof in your grove.



NEW VOLUTE ATTACHMENT oscillates air stream to open up thickest foliage for positive, through-the-tree spray coverage. Available for either right or left discharge or double delivery.

NEW PRESTOMATIC CONTROLS for spray delivery plus throttle control. Panel mounts on tractor fender within finger-tip reach of driver.

"LITTLE" FEATURES MAKE THE DIFFERENCE IN SPEED SPRAYER QUALITY

RUST-RESISTANT TANKS are protected by exclusive Metallizing process — no rust to clog nozzles, longer tank life assured.

SPRAY MATERIAL SIGHT GAUGE saves time, eliminates guesswork. Shows exactly the level of spray material in the tank.

NEW, DRY-TYPE AIR CLEANER Efficient, heavy duty air filter traps dirt, minimizes engine "down-time". Control panel light automatically signals when filter needs cleaning.

HEAVY CHANNEL BOX FRAME Arc-welded frame with multiple cross members won't twist or bend even over roughest terrain.

DEMONSTRATION PROOF IN YOUR GROVE! See for yourself how Speed Sprayer performance gives you best coverage . . . best protection for your trees. Ask us for a demonstration in your grove. Call or write Orlando plant for full details — also ask about our liberal trade-in and financing plans.

For latest data on SHUR-RANE ENGINEERED IRRIGATION write us at Orlando

CONTACT

Speed Sprayer Plant, Orlando, Fla.

also southern sales headquarters for BOLENS outdoor power equipment

John BEAN®

DIVISION OF
FOOD MACHINERY AND CHEMICAL CORPORATION
LANSING, MICHIGAN • ORLANDO, FLORIDA • SAN JOSE, CALIFORNIA

fmc

24-County Report on Conditions Of This Season's Citrus Crops

Recent cool weather throughout Florida's citrus belt is causing a good color break on oranges, Robert W. Rutledge, Florida Citrus Mutual executive vice president, said today in a current crop condition report.

Rutledge said the 24-county report, compiled by Mutual field men, is a representative sampling and not all inclusive.

"In many areas tree recovery from damage caused by the hurricane has been most gratifying," Rutledge said. "The uniform growth on defoliated trees has matured and promises to harden up before the serious cold period arrives."

Excepts from the report by counties:

POLK—The lack of rain in the past few weeks has both good and bad effects. Fruit splitting has slowed down and groves have dried out so that cultivation and fertilization can be done. On the other hand, some spots that got awfully wet a month ago are now beginning to show serious moisture deficiency. Small sizes of early variety oranges are hampering fresh fruit operations. Valencia sizes appear to be more normal.

LAKE, CITRUS and SUMTER—Most growers have cut in their cover crops and are banking young trees in preparation for cold weather. The on-tree crop continues to mature in good condition. Some fertilization is being done and some growers are finding it necessary to use control measures for mites and scale.

HILLSBOROUGH—Some groves are showing considerable loss of fruit from splitting. Growers are spreading their Fall fertilizer application now.

PASCO—Fruit drop from splitting is bad in some groves with Hamlins, seedlings and Valencias suffering the most. Red scale is showing a population build-up. Buying activity has been somewhat slow in the past week.

HERNANDO—The past few weeks without rain has helped dry out groves in this area. There is some fruit splitting but not severe. Some cultivation and young tree banking is being done.

PINELLAS—Fruit sizes are small and advancement of internal maturity is slow. Some groves are losing fruit from splitting. Control measures are being taken for mites.

HARDEE—Fruit has not advanced in size as had been expected but color break is good. There has been a good deal of fruit splitting reported from some groves but most of this loss seems to be over.

ORANGE, OSCEOLA and SEMINOLE—Midseason and Valencia oranges seem to be the only fruit sizing to any degree. Tangerines are also small and late in maturing. Size of grapefruit is fair.

VOLUSIA and PUTNAM—Growers feel that because of small sizes there will be very little movement of tangerines before Thanksgiving and perhaps very little movement before Jan. 1. Young trees are being banked for cold weather.

MARION—An excellent color break is showing on fruit as the result of recent cool nights. Quality of fruit is good but sizes are small. Buying activity is light because most of the fruit in this area has been committed.

ST. LUCIE, INDIAN RIVER and BREVARD—Tree condition is very good with moisture just right for cultivation and fruit harvesting. The fruit, all varieties, is small and both oranges and grapefruit are slow in maturing. No buying activity reported in this area.

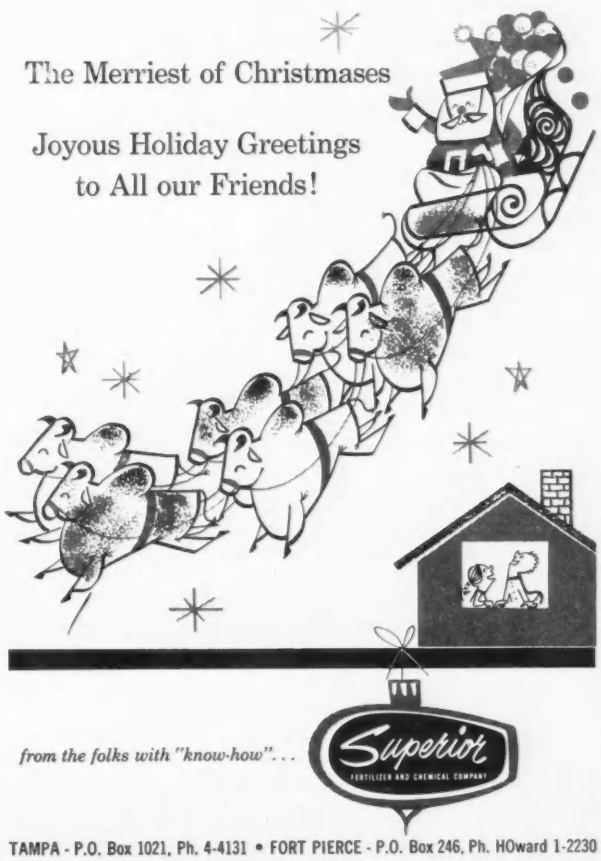
MANATEE and SARASOTA—Fruit sizes are small but quality is good. There is some splitting and dropping of oranges which is more noticeable on Valencias than other varieties.

LEE and HENDRY—A few groves in this area are still too wet to clean up from storm damage. However, groves that have been cultivated and fertilized are showing a good growth and color.

HIGHLANDS—Tree and moisture condition is good. There is a good new growth on trees with a healthy color. Early variety oranges are being moved in volume to both fresh fruit houses and chilled juice plants but slow maturity of oranges is keeping harvesting at a slow pace.

DeSOTO—Young or budded groves generally have been worked and fertilized and are looking good with good growth and color.

Household consumers bought a larger volume of frozen concentrated juices in August 1960 than a year ago, but purchases of single-strength juices, fruit drinks, and fresh and canned citrus fruit were down in total.


The Merriest of Christmases
Joyous Holiday Greetings
to All our Friends!
from the folks with "know-how"...
Superior
FERTILIZER AND CHEMICAL COMPANY
TAMPA - P.O. Box 1021, Ph. 4-4131 • FORT PIERCE - P.O. Box 246, Ph. HOward 1-2230

KELTHANE KILLS MITES

Fast kill and long-lasting residual activity against *all* citrus mites is yours with KELTHANE. Use this non-phosphate miticide during fall and winter for a thorough clean-up of mites in your groves.

Slow-killing miticides let mites migrate, after spraying, to other trees or to rapidly developing new growth. This allows them to build up and injure tender, new foliage. Don't give mites this chance. Stop them with KELTHANE.

See for yourself how quickly KELTHANE kills *all* citrus mites. KELTHANE is compatible with most citrus pesticides and does not harm beneficial insects. See your dealer for KELTHANE.

Chemicals for Agriculture

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

KELTHANE is a trademark, Reg. U.S. Pat. Off. and in principal foreign countries.

The Citrus Industry
EXCLUSIVE SPECIALIZED CITRUS PUBLICATION
Issued Monthly
Representative of every interest
Representing no special interest

Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under act of March 3, 1879.

A Comparison of Magnesium Sources In Young Orange Trees

W. F. SPENCER[1] AND
I. W. WANDER[2]
FLORIDA CITRUS EXPERIMENT STATION, LAKE ALFRED

Magnesium has been used in citrus fertilizers in Florida for many years, but specific information is lacking on the magnesium needs of young trees. Bryan and Debusk (1) first reported that bronzing of citrus was due to a deficiency of magnesium. They prevented bronzing with dolomite applications. Tait (12) conducted the first magnesium source experiment in Florida citrus when he compared Epsom salts and dolomite as correctives for citrus bronzing. Feech (8) and Fudge (4), when comparing the use of dolomite, magnesium sulfate and magnesium carbonate on orange and grapefruit trees, found that leaf magnesium content and extractable soil magnesium were highest in plots receiving magnesium carbonate. During World War II, when water soluble magnesium materials were in short supply, sea water magnesia and other magnesium oxides were used in citrus fertilizers with questionable results (2). Wander (13) in pot experiments with sweet orange seedlings found that olivine and dolomite were available sources of magnesium for citrus as measured by growth and leaf magnesium content.

The field experiment reported here was initiated by Wander to compare the availability of relatively insoluble magnesium sources with commonly used Emjeo and to determine the magnesium needs of young trees growing in previously unfertilized soil. Magnesium deficiency is difficult to correct and usually results in premature loss of bronzed leaves. Thus, it is of considerable importance, especially in rapidly growing young trees, to develop means of anticipating the likely occurrence of magnesium deficiency so that it can be prevented. Correlations between leaf magnesium content, extractable soil magnesium and the occurrence of magnesium deficiency symptoms were studied with this objective in mind.

Experimental Methods

This experiment was conducted with Valencia and Pineapple orange trees on rough lemon rootstock planted April 1, 1953, in previously unfertilized Lakeland fine sand at the Citrus Experiment Station. The differential magnesium treatments were initiated the following year in March, 1954. The treatments involve a factorial combination of four sources of magnesium, sea water magnesia, Emjeo, dolomite, and olivine each applied at three rates, 1, 3, and 9 percent MgO in the fertilizer. In addition, two of these sources, dolomite and olivine, were applied at two rates broadcast in one application at the start of the experiment with no additional magnesium in the fertilizer. The experimental design was a randomized block with three replications of treatments for Valencia and two for Pineapple orange trees.

The sea water magnesia was magnesium oxide made by heating magnesium carbonate produced from sea water. It is an alkaline material containing approximately 90 percent MgO. The Emjeo (Calcined Kieserite) was the commercially available magnesium sulfate material. The dolomite was a commercially available liming material from Florida mines containing approximately 20 percent MgO equivalent. Olivine—a magnesium iron silicate containing approximately 45 percent MgO—was obtained from mines in North Carolina. The broadcast dolomite was applied at rates of 206 and 2,340 pounds per acre. The broadcast olivine was applied at rates of 115 and 1,040 pounds per acre.

All trees received an 8-8-8-0-1-0.5 fertilizer mixture in amounts according to the previously recommended schedule of growing young trees (9). Nitrogen in the mixed fertilizer was derived equally from calcium nitrate and ammonium nitrate. The magnesium source materials were mixed with sand and applied as a separate

1—Associate Soils Chemist

2—Formerly Soils Chemist, Florida Citrus Experiment Station, Lake Alfred, Florida, now General Manager, Growers Fertilizer Cooperative, Lake Alfred.

Florida Agricultural Experiment Station Journal Series No. 1176.

application at approximately the same time as the regular fertilizer. The trees were hand fertilized in a ring around the trees for the first five years, but since 1959 the fertilizer has been broadcast over the entire ground surface.

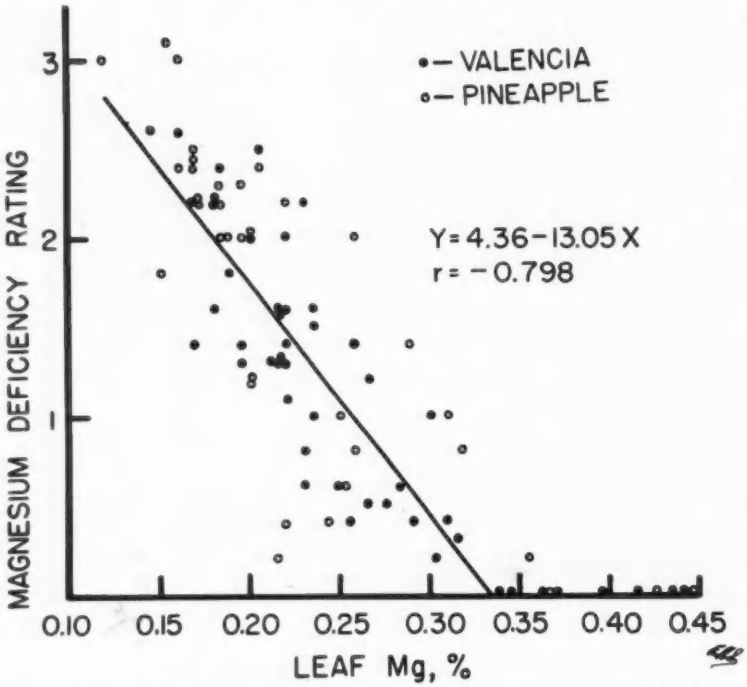


Figure 1. Relationship between the magnesium content of spring flush leaves in July and incidence of magnesium deficiency in December.

The trees were propagated in the Citrus Station nursery using budwood from several trees of each variety. Commonly used nursery practices were followed including selection and roguing of seedlings. Consequently, the trees were fairly uniform when planted. The trees were spaced 30 feet apart in the row with 15 feet between alternate rows of Valencia and Pineapple orange trees.

The relative efficiency of the various magnesium sources and rates were evaluated by measuring tree growth, magnesium uptake by the tree, severity of magnesium deficiency leaf symptoms, and extractable soil magnesium. Data on yield and fruit quality were obtained but are not included in this report since they were not affected by the magnesium treatments.

Tree growth was evaluated by measuring trunk circumference at six inches above the bud union in the spring of 1954 and subsequently in 1958 and 1960. Spring flush leaves from non-fruiting twigs were sampled for chemical analysis on July 17, 1959. Magnesium was applied prior to this sampling on July 8. Each tree was rated for severity of magnesium deficiency on December 10, 1959, in accordance with the rating scale outlined in Table 4. The magnesium materials were applied on December 23, 1959, and soil samples from the 0-6-inch depth were obtained on January 29, 1960. The exact sampling and fertilizing sequence is mentioned here since it could possibly influence the interpretation of treatment effects reported herein. Magnesium and potassium were determined in perchloric acid digests of the dried leaf tissue—magnesium by the rapid 8-quinolinol method of Willson (14) and potassium with a Beckman flame photometer. Soil magnesium was determined in neutral normal ammonium acetate extracts by the thiazol yellow method of Mehlich (7).

Results

Tree Growth.—There were no significant effects of either sources or rates of magnesium on tree growth as measured by increase in trunk circumference from 1954 to 1960 (Tables 1 and 2).

Leaf Analyses.—The magnesium content of leaves was affected appreciably by the source and rate of applied magnesium (Tables 1 and 2). The magnesium content of leaves increased as the rate of magnesium was increased. The magnesium content of Valencia orange leaves in Table 3 illustrates the interaction effects of source and rate of applied magnesium on leaf magnesium content. The magnesium content was highest in trees receiving sea water magnesia closely followed by Emjeo. Olivine appeared to be a relatively poor source of magnesium from the standpoint of magnesium uptake. The broadcast application of 2,340 pounds of dolomite per acre, and the 9 percent MgO rate of dolomite, resulted in a leaf magnesium content comparable with the medium rate of Emjeo. The leaf magnesium content of Pineapples was slightly lower than that of Valencias. This is undoubtedly due to the fact that Pineapples are a seeded variety,

(Continued on page 8)

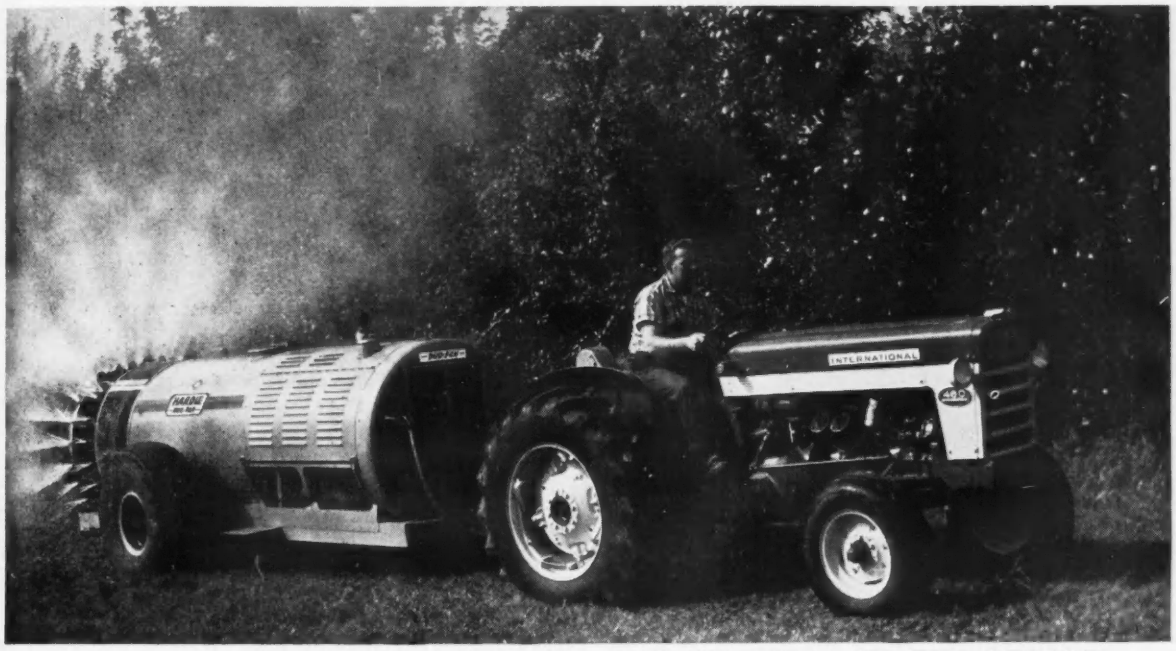
Table 1. Effect of source and rate of magnesium applied to Valencia orange trees on increase in trunk circumference, magnesium and potassium content of leaves, magnesium deficiency ratings, extractable soil magnesium and soil pH.

Magnesium Treatment	Increase in Trunk Circumference 1954-60, inches	Leaf Mg %	Leaf K %	Mg Deficiency Rating[4]	Extractable Soil Mg lb/A	Soil pH
Source of Mg[1]						
Sea water Magnesia	10.0	0.314	1.66	0.7	85	5.4
Emjeo	10.7	0.294	1.83	0.8	39	5.0
Dolomite	10.3	0.241	1.69	1.1	48	5.5
Olivine	10.6	0.214	1.82	1.5	17	5.1
L.S.D. .05	n.s.	0.018	n.s.	0.2	17	—
Rate, % MgO in fertilizer[2]						
1	10.5	0.203	1.89	1.7	14	5.1
3	10.2	0.256	1.71	1.1	37	5.1
9	10.6	0.338	1.65	0.2	91	5.5
L.S.D. .05	n.s.	0.015	0.17	0.2	15	—
Interaction (source x rate)	n.s.	xx	n.s.	xx	xx	—
Broadcast applications[3]						
Dolomite 260 lb/A	11.1	0.192	1.73	1.8	4	5.0
Dolomite 2340 lb/A	10.3	0.298	1.58	0.5	30	5.3
Olivine 115 lb/A	10.7	0.194	1.80	1.8	3	5.0
Olivine 1040 lb/A	11.0	0.215	1.35	1.4	8	5.1
L.S.D. .05	n.s.	0.039	n.s.	0.6	29	—

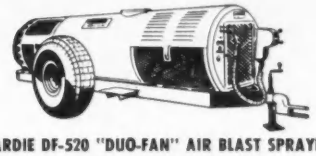
xx—Significant interaction between source and rate of magnesium
1—Each value is the mean of 9 plots
2—Each value is the mean of 12 plots
3—Each value is the mean of 3 plots
4—See footnote Table 4 for rating scale.

READY FOR A SPRAYER?

SELECT A HARDIE

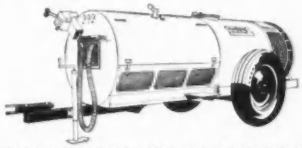


HIGHEST PERFORMANCE LEVEL OF ANY SPRAYER IN THE WORLD...



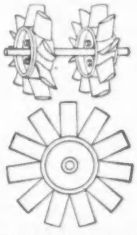
HARDIE DF-520 "DUO-FAN" AIR BLAST SPRAYER

Perfect for the medium size grower, delivering over 62,500 cubic feet of air per minute.



HARDIE DF-480 "DUO-FAN" AIR BLAST SPRAYER

Perfect for the smaller grower, delivering over 40,000 cubic feet of air per minute.



"DUO-FANS" EQUAL ONE BIG FAN

Hardie exclusive patented "Duo-Fan" assembly is standard equipment on all sprayers. Delivers 50% more air volume than conventional axial flow fans.

AIRCRAFT TYPE REMOTE CONTROLS

Dependable . . . Proven . . . Hardie aircraft-type remote controls are simple, rugged, controls throttle and spray delivery on one or both sides.

That's just what you get . . . no matter which of the many models you choose. Measured by any standard, judged by any detail, the HARDIE Duo-Fan, two fan sprayers are the greatest and most advanced sprayers ever built.

Not only are these sprayers bigger than ever before, but each and every part right down to the nozzle tips saves time and labor, and cuts maintenance costs to the vanishing point. HARDIE sprayers simply are bigger and stronger than any other sprayer on the market.

Just look at the many exclusives: HARDIE sprayers permit you to adjust nozzles, even change tips easily and quickly in the field. Spray the largest trees on BOTH sides of the row, and meet the most gruelling tests with more than ample capacity and power. HARDIE sprayers give you adjustable air guide vanes to meet your most exacting requirements. HARDIE gives you two large aluminum axial flow fans which provide more working area than any other sprayer in its class. HARDIE gives you stainless steel tanks, stainless agitator shafts, stainless agitator paddles, stainless drive tubes, all stainless interior piping. HARDIE gives you dependable proven aircraft-type remote controls. Heavy duty construction, simple design, easy to operate. Controls throttle and spray delivery on one or both sides. HARDIE HAS JUST THE SPRAYER FOR YOU . . . The DF-480 delivering over 40,000 cubic feet of air per minute, and made for the smaller grower . . . The DF-520 delivering over 62,500 cubic feet of air per minute, and made for the medium size grower . . . The DF-800 delivering over 97,500 cubic feet of air per minute and made for the larger grower.

There are many more exclusives in the more than 17 Duo-Fan Models you can choose. See your HARDIE Dealer soon, or fill in and mail the coupon below today.

HARDIE
AGRICULTURAL SPRAYING EQUIPMENT
• SOLD AND SERVICED •
DELIVERS THE WORLD

AGRICULTURAL SPRAYERS
•
HIGH PRESSURE PUMPS
•
DUSTERS

THE HARDIE MANUFACTURING CO., INC., DEPT. CI
WILKES-BARRE, PENNSYLVANIA

☐ *Have a Hardie salesman call on me.*
Details on ☐ *DF-800* ☐ *DF-520* ☐ *DF-480*
☐ *Info., on Dealer territories available*

NAME_____

ADDRESS_____

CITY_____ **STATE**_____

SERVING THE FRUIT GROWERS FOR MORE THAN 66 YEARS

A COMPARISON OF MAGNESIUM SOURCES FOR YOUNG ORANGE TREES

(Continued from page 6)

whereas Valencias are a seedless variety.

The potassium content of leaves was reduced slightly by the highest rate of applied magnesium (Tables 1 and 2). Trees receiving sea water magnesia and dolomite tended to be lower in potassium than trees receiving the other magnesium sources. However, this latter effect was not statistically significant. The nitrogen, phosphorous and calcium contents of leaves were not affected by either source or rate of magnesium. This was somewhat unexpected since even the highest rate of dolomite did not increase the calcium content of leaves above that in plots receiving no dolomite or other liming material.

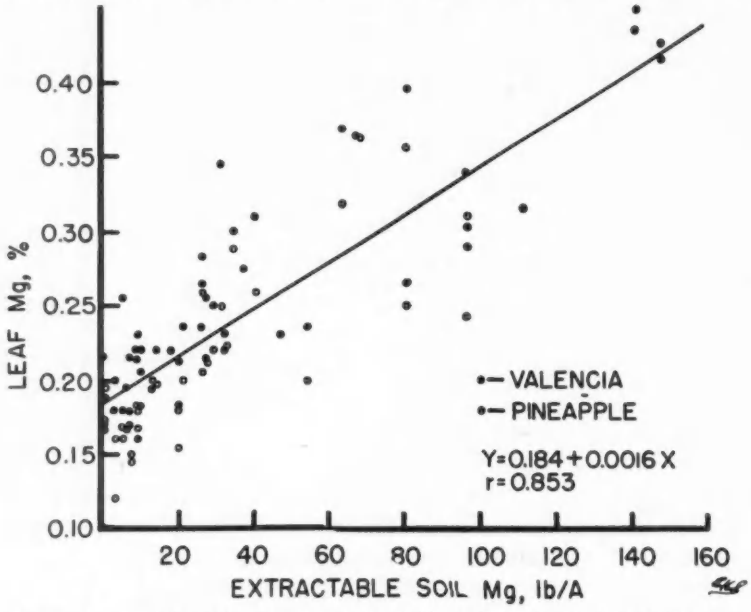


Figure 2. Relationship between extractable soil magnesium and the magnesium content of spring flush leaves in July.

Soil Analyses.—The sea water magnesia resulted in a higher extractable soil magnesium content that the other materials (Table 1). Dolomite was second in this regard closely followed by Emjeo. Olivine resulted in a very low extractable magnesium content of the soil. Sea water magnesia and dolomite slightly increased the soil pH, whereas the other materials had essentially no effect on it. It should be noted that the soil pH in most plots was lower than is generally recommended for citrus (9).

Magnesium Deficiency Symptoms.—Magnesium deficiency symptoms occurred for the first time during the fall of 1959. Both the Valencia and Pineapple trees produced their first sizeable crop of fruit in 1959 which probably accounted for the extensive occurrence of magnesium deficiency symptoms. These symptoms increased in severity as the fruit matured. All trees were rated as to severeity of deficiency symptoms on December 10, 1959. The results of this examination are shown in Tables 1 and 2 for Valencia and Pineapple oranges respectively. The magnesium deficiency symptom ratings of Valencia orange trees as affected by sources and rates of magnesium are shown in greater detail in Table 4. This table is included to show the interaction effects of source and rate of magnesium on deficiency ratings. Similar interaction effects were noted in the case of extractable soil magnesium.

The ratings indicate that magnesium deficiency was decreased by increasing rates of magnesium and that sea water magnesia and Emjeo were somewhat superior to dolomite and olivine as sources of magnesium. Dolomite applied broadcast at 2,340 pounds per acre and both dolomite and olivine, when applied at rates of 9 percent MgO in the fertilizer, resulted in very few magnesium deficiency symptoms. However, trees receiving the broadcast applications of olivine exhibited severe magnesium deficiency.

As would be expected from the lower leaf content of leaf magnesium, the average deficiency rating was higher for Pineapples, a seeded variety, than it was for Valencias.

Relationships Between Deficiency Symptoms, Leaf and Soil Analysis.—The severity of magnesium deficiency in December was highly significantly correlated with the magnesium content of spring flush leaves sampled in July. This relationship, shown in Figure 1, was the same for both varieties. The linear regression curve expressing this relationship indicates that a leaf magnesium content of 0.33 in July would result in no magnesium deficiency symptoms during that crop year even though additional magnesium was not applied. Magnesium deficiency patterns were found on only one tree out of 55 which had an average leaf magnesium content above this level.

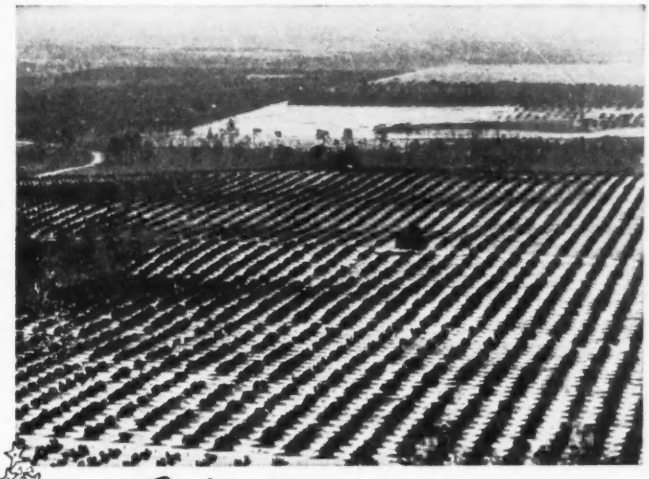
The leaf magnesium content was

(Continued on page 10)

Table 2. Effect of source and rate of magnesium applied to Pineapple orange trees on increase in trunk circumference, magnesium and potassium content of leaves, and magnesium deficiency ratings.

Magnesium Treatment	Increase in Trunk Circumference 1954-60, inches	Leaf Mg Percent	Leaf K Percent	Mg Deficiency Ratings
Source of Mg[1]				
Sea water Magnesia	10.4	0.290	1.89	1.3
Emjeo	0.224	0.283	0.375	0.294
Dolomite	10.3	0.217	1.80	1.6
Olivine	11.1	0.191	1.97	1.6
L.S.D. .05	n.s.	0.026	0.25	0.5
Rate, % MgO in fertilizer[2]				
1	10.9	0.171	2.09	2.4
3	10.5	0.231	1.94	1.4
9	10.1	0.322	1.87	0.3
L.S.D. .05	n.s.	0.023	0.22	0.4
Interactions (source x rate)	n.s.	xx	n.s.	n.s.
Broadcast applications[3]				
Dolomite 260 lb/A	10.0	0.171	2.14	2.2
Dolomite 2340 lb/A	11.9	0.223	2.03	0.9
Olivine 115 lb/A	9.4	0.147	1.87	2.6
Olivine 1040 lb/A	10.3	0.176	1.70	2.5
L.S.D. .05	n.s.	0.052	n.s.	1.2

xx—Significant interaction between source and rate of magnesium
1—Each value is the mean of 6 plots
2—Each value is the mean of 8 plots
3—Each value is the mean of 2 plots
4—See footnote Table 4 for rating scale.



3 IMPORTANT THINGS TO REMEMBER

1. Glen guarantees every tree to live.
2. No increase in prices since 1956.
3. Nursery stock certified nematode-free.

GLEN SCORES AGAIN!

Last year, out of the many thousands of trees supplied our customers, they report an overall loss of less than one-half of one percent. This is just another indication of fine quality Glen-grown trees.

For Delivery This Coming Planting Season--Glen St. Mary Offers--Subject to Prior Sale

ON ROUGH LEMON STOCK

Hamlin
Murcott
Pineapple
Parson Brown
Tangerine
Valencia
Lue Gim Gong
Orlando Tangelo
Marsh Seedless G.F.
Harvey Lemon
Meyer Lemon
Tahiti Lime
Nagami Kumquat

ON SOUR ORANGE STOCK

Hamlin
Pineapple
Temple
Valencia
Lue Gim Gong
Orlando Tangelo
Minneola Tangelo
Marsh Seedless G.F.

ON SWEET SEEDLING STOCK

Hamlin
Valencia
Lue Gim Gong

ON CLEOPATRA STOCK

Hamlin
Murcott
Pineapple
Temple
Orlando Tangelo

To replace trees lost in hurricane Donna, Glen has large two-year trees in many varieties.

DUE TO ADVANCE BOOKINGS, SUPPLY IS ALREADY LIMITED IN MANY VARIETIES. WE SUGGEST YOU GET IN TOUCH WITH US PROMPTLY. . . .NEW CITRUS CATALOG JUST OFF THE PRESS. SEND FOR YOURS TODAY!

GLEN SAINT MARY NURSERIES CO.

CENERAL OFFICE: American National Bank Bldg., Winter Haven, Florida, Phone CY 3-3554

Largest Citrus Nurseries In The World

A. P. PHILLIPS CO. ADVERTISING, ORLANDO Orlando Representative: R. W. (Bob) Parker Phone: GA 3-6839

A COMPARISON OF MAGNESIUM SOURCES FOR YOUNG ORANGE TREES

(Continued from page 8)

highly correlated with the amount of extractable soil magnesium (Figure 2). This relationship was similar for both the Valencia and Pineapple varieties. However, the individual plot values in Figure 2 and Tables 1 and 2 indicate that at low extractable soil magnesium levels, leaf magnesium was somewhat lower in Pineapple than in Valencia trees.

The relationship between extractable soil magnesium and deficiency ratings was also highly significant. The linear regression equation expressing this relationship was $Y = 1.99 - 0.019X$ with a correlation coefficient, r, of -0.659. The relationship between extractable soil magnesium and the other two variables, leaf magnesium and deficiency rating, will undoubtedly vary from year to year and from grove to grove depending upon the amount of crop produced, rainfall, and other factors affecting magnesium uptake from the soil.

Discussion

The data indicate that the citrus tree's needs for magnesium are fairly small until the trees bear an appreciable quantity of fruit. There was no difference in tree growth due to the wide range in magnesium applied to the trees during the first six years of this experiment. No magnesium deficiency symptoms appeared on the foliage until six years after the trees were planted regardless of the source or rate of applied magnesium. The data indicate that broadcast dolomite applications are probably sufficient as a source of magnesium for the first few years before the trees produce a sizeable crop of fruit. This may be for the first five to six years the trees are in the grove. The data are inadequate to show whether or not dolomite alone, as a liming material, can meet the trees' increased needs for magnesium after the trees reach bearing age. The experiment is being continued, and it is hoped that the question will be satisfactorily answered in the future. During 1959, the first year the trees produced an appreciable quantity of fruit, deficiency symptoms occurred extensively, but yields were approximately 1½ boxes of oranges per tree regardless of magnesium treatment. The data indicated that Emjeo or sea water magnesia applied at the rate of 3 percent MgO in the fertilizer supplied sufficient magnesium for the trees' needs.

Under the conditions of this experiment, sea water magnesia was slightly superior to commercially available Emjeo as a source of magnesium. The soil analysis for extractable magnesium indicated that more magnesium was retained in the surface soil from sea water magnesia applications than from Emjeo. Peech (8) found that magnesium carbonate and dolomite applications to Lakeland fine sand resulted in higher exchangeable soil magnesium levels than did applications of magnesium sulfate. MacIntire and co-workers (6) in lysimeter experiments also found that magnesium from magnesium oxides and other alkaline magnesium sources were fixed in acid soil with conservation of magnesium in contrast to rapid outgo of water soluble magnesium salts. This possibly explains the apparent superiority of magnesium oxide—sea water magnesia—over Emjeo in this experiment. The acid soil, without the addition of liming materials, was better able to maintain a constant supply of magnesium from sea water magnesia than from the more soluble Emjeo.

The results may have been quite different if the magnesium materials had been compared at a higher soil pH level. Camp et al. (2) stated that magnesium oxide was not a suitable substitute for water soluble magnesium sulfate in citrus fertilizers. They reported that magnesium oxide was not sufficiently available, especially at a soil pH above 6.0, to prevent widespread development of magnesium deficiency symptoms. In view of the fact that most alkaline magnesium materials become less available as the pH is increased, recommendations concerning the use of sea water magnesia in citrus fertilizers for bearing trees cannot be made until its availability has been evaluated at higher soil pH levels. Furthermore, sea water magnesia is an alkaline material which may release ammonia from mixed fertilizers containing ammonia source materials.

Although olivine did supply some magnesium, it proved to be a relatively unavailable source of magnesium for trees growing in the field. This is in contrast with the results reported by Wander (13) in which olivine proved to be an available source of magnesium in pot experiments. This difference in response is probably due to the high rate of magnesium applied in the pot experiments and to the fact that the olivine was mixed in the entire volume of soil in which the potted seedlings were grown. In the field, olivine was applied on the soil surface, and its low solubility did not allow sufficient magnesium to move into the root zone of the trees.

The relationship between magnesium in leaves and the appearance of magnesium deficiency symptoms reported herein corroborate the findings reported by Fudge (3, 5) on the early diagnosis of magnesium deficiency in citrus. Fudge concluded that, if the magnesium content of spring flush foliage is greater than 0.35 percent Mg in April and soluble magnesium to the extent of 2 to 4 units of Mgo are contained in the summer fertilizer, no magnesium deficiency will occur in the foliage that fall. This value of 0.35 is essentially the same

(Continued on page 24)

Table 3. Magnesium content of spring flush leaves as affected by magnesium sources applied at three rates to Valencia orange trees.

Source	Rate, % Mgo in Fertilizer 1	3	9	Mean
Sea water Magnesia	0.210	0.304	0.429	0.314
Emjeo	0.224	0.283	0.375	0.294
Dolomite	0.196	0.223	0.303	0.241
Olivine	0.183	0.215	0.245	0.214
Mean	0.203	0.256	0.338	

Table 4. Magnesium deficiency symptom ratings as affected by magnesium sources applied at three rates to Valencia orange trees.[1]

Source	Rate, % Mgo in Fertilizer 1	3	9	Mean
Sea water Magnesia	1.7	0.3	0.0	0.7
Emjeo	1.4	0.9	0.0	0.8
Dolomite	1.5	1.6	0.3	1.1
Olivine	2.3	1.7	0.5	1.5
Mean	1.7	1.1	0.2	

[1]Ratings made on December 10, 1959, based on the following rating scale:
0.—No magnesium deficient leaves.
1.—Two or three leaves per tree with magnesium deficiency symptoms.
2.—Several to many magnesium deficient leaves per tree with no difficulty in finding magnesium deficient leaves on close inspection.
3.—Deficiency symptoms apparent from a distance with many deficient leaves per tree.
4.—High percentage (approximately 75%) of leaves exhibiting deficiency patterns with trees having an over-all bronzed appearance.

Citrus Yield Per Tree By Age

BY ZACH SAVAGE
AGRICULTURAL ECONOMIST
FLORIDA AGRI. EXP. STATIONS

There are many factors that influence yields of citrus fruit. Some of these factors cannot be controlled, some can be partially controlled and others that can be largely controlled. Inherent factors of the variety and kind of citrus influence tendencies for high or low yields. Some varieties and kinds tend to bear more heavily on alternate seasons with intervening seasons of lower yields. Generally, yields following high yielding seasons tend to be lower. Health and vigor of the tree materially affect yield. Adequacy and proper ratio to each other of the necessary fertilizer elements present tend toward high yields. Insect and disease control are very important in maintaining high yields. There are many other factors that may enter into the picture, not the least of which are adequate temperatures and soil moisture.

There has been a tendency over the past two decades for yields of most varieties to be higher at comparable ages than prior to this period. There are a number of contributing factors to this increase such as better fertilization, better insect and disease control, better nursery stock and better grove management in general.

Maintaining a large number of favorable production factors tend toward continuous high yields. However, it frequently happens that for various and sundry reasons—not all of which can be accounted for adequately—yields are low during some seasons. At times, yields are extremely low. These variations make it hard to arrive at representative figures for the various kinds of citrus.

Average or usual yields are sometimes used in indicating what may be expected in yields over a period of time. However, such data do not indicate what may be expected in variations from the average yield of a particular grove or between yields of different groves. Data of this publication include an average or normal yield generally expected, a high yield representing the average of the best groves and/or the high yields of the best seasons of lower yielding groves and a low yield figure representing the average of the low yielding groves and/or low yields of better groves during seasons of poor production. The "average" figure may be used as the yield to be expected from the average grove when conditions are similar to those of the 10 seasons of 1947-57. However, the spread between the "high" and the "low" figure represents the area in which most yields would fall during most seasons. An extremely high yielding grove might equal or exceed the "high" figures in some instances.

These data were obtained from yields on groves included in grove accounts of cooperating growers in studies under way by the Florida Agricultural Extension Service and Experiment Stations.

Table 1. EARLY ORANGE YIELD IN BOXES PER TREE

Age of Tree	Average	High	Low
1			
2			
3	.2	.4	
4	.7	1.1	.3
5	1.2	1.8	.5
6	1.7	2.5	.7
7	2.2	3.2	1.0
8	2.7	3.9	1.3
9	3.1	4.6	1.5
10	3.5	5.3	1.7
11	3.9	6.0	2.0
12	4.3	6.7	2.2
13	4.6	7.4	2.3
14	4.9	8.1	2.5
15	5.2	8.8	2.7
16	5.5	9.3	2.8
17	5.7	9.8	2.9
18	5.8	10.2	3.0
19	5.9	10.5	3.1
20	6.0	10.8	3.2
21	6.1	11.0	3.3
22	6.2	11.2	3.4
23	6.3	11.3	3.5
24	6.4	11.5	3.5
25	6.5	11.6	3.5
26	6.5	11.6	3.5
27	6.6	11.7	3.5
28	6.6	11.8	3.5
29	6.6	11.9	3.5
30	6.7	12.0	3.5
31	6.7	12.0	3.5
32	6.7	12.0	3.5
33	6.7	12.0	3.5
34	6.8	12.0	3.5
35	6.8	12.0	3.5
36	6.8	12.0	3.5
37	6.8	12.0	3.5
38	6.8	12.0	3.5
39	6.8	12.0	3.5
40	6.8	12.0	3.5
41	6.9	12.0	3.5
42	6.9	12.0	3.5
43	6.9	12.0	3.5
44	6.9	12.0	3.5
45	6.9	12.0	3.5
46	7.0		
47	7.0		
48	7.0		
49	7.0		
50	7.0		
51	7.0		
52	7.0		
53	7.0		
54	7.0		
55	7.0		

Table 2. MIDSEASON ORANGE YIELD IN BOXES PER TREE

Age of Tree	Average	High	Low
1			
2			
3	.3	1.1	
4	.7	1.9	.2
5	1.1	2.6	.5
6	1.6	3.2	.8
7	2.0	3.8	1.1
8	2.4	4.3	1.4
9	2.8	4.8	1.6
10	3.1	5.3	1.8
11	3.4	5.7	2.1
12	3.7	6.1	2.3
13	4.1	6.5	2.5
14	4.4	6.9	2.7
15	4.6	7.2	2.8
16	4.8	7.6	3.0
17	5.1	7.9	3.1
18	5.3	8.2	3.2
19	5.4	8.4	3.3
20	5.6	8.7	3.4
21	5.7	8.9	3.5
22	5.8	9.2	3.5
23	5.9	9.4	3.6
24	6.0	9.7	3.6
25	6.0	9.9	3.7
26	6.0	10.1	3.7
27	6.0	10.3	3.8
28	6.0	10.5	3.8
29	6.0	10.7	3.8
30	6.0	10.8	3.9
31	6.0	11.0	3.9
32	6.0	11.0	3.9
33	6.0	11.0	3.9
34	6.0	11.0	3.9
35	6.0	11.0	4.0
36	6.0	11.0	4.0
37	6.0	11.0	4.0
38	6.0	11.0	4.0
39	6.0	11.0	4.0
40	6.0	11.0	4.0

(Continued on page 20)

ORTHO® ALMANAC FOR FLORIDA GROWERS

ORTHO Florida Citrus Spray Program: how and when to treat your crops for better yields

December is the time to...

Start applying ORTHO Nutritional Sprays. There are available four basic ORTHO Nutritional Sprays, containing copper, zinc, manganeze and boron. Your ORTHO Fieldman can provide a custom mix including the necessary minor elements, depending on the individual needs of your grove.

Use ORTHO Spray Sticker when applying wettable powders. This highly adhesive liquid sticker is specially designed to increase resistance to rain by helping to keep wettable powder deposits from washing off. Extensive use has shown ORTHO Spray Sticker has increased the adhesiveness of various wettable powder formulations following one to four inches of rain, to an extent that from 50-40% of the original deposit remains as compared to 25-15% when no sticker is used.

Choose the ORTHO Citrus Spray Program. With the ORTHO Spray Program you buy ORTHO products formulated in Orlando specially to fit your needs, plus the benefits of ORTHO Field Service. Your crops get scientific supervision right through harvest, by fieldmen trained to spot the trouble and prescribe the remedy. This expert Field Service, combined with the research and technical experience that go into every ORTHO product, is the reason why ORTHO has been the choice of Florida growers for over 35 years.

ORTHO®

Helping the World Grow Better

For the ORTHO Citrus Spray Program best suited to your special needs, call your nearest ORTHO Fieldman!

California Spray-Chemical Corp. A subsidiary of California Chemical Co., P.O. Box 7067, Orlando, Florida

ON ALL CHEMICALS, READ DIRECTIONS AND CAUTIONS BEFORE USE. • TRITHION IS REG. T. M. OF STAUFFER CHEMICAL CO. T.M.'S REG. U.S. PAT. OFF.: ORTHO.

Meet your ORTHO team...

CLIFF SUTTON

Manager of North Florida Branch of Calspray located in Orlando. Received his B. S. degree in agriculture from University of Florida. Call Cliff at Winter Garden Branch Office, OL 6-2626.

CHARLES ASHLEY

Received his B. S. in entomology from Auburn. Worked three years citrus spraying and two years as a laboratory assistant before joining Calspray. Resides in Leesburg, phone ST 7-2063.

WEBSTER CARSON

Joined Calspray in 1956 after receiving his B. S. degree in agriculture from University of Florida. Resides in Plant City—contact him by calling 3-8351.

JEAN MABRY

Served as an entomologist for two years with the U. S. Army before joining Calspray in 1955. Received his degree in agriculture from U. of Florida. Jean resides in Lakeland. Call MU 6-4515.

J. S. MURPHY

Received his degree in agriculture from University of Florida. Before joining Calspray in 1955, worked at Citrus Experiment Station. Resides in Lake Alfred, phone FR 2-1422.

JOHN NOWELL

Received his B. S. degree in agriculture from University of Florida. Joined Calspray in 1955. John lives in Orlando. Reach him at GArden 4-6754.

RANDALL WILLIAMS

Randy sold livestock and poultry feeds before joining Calspray in 1957. Received his degree in agriculture from University of Florida Resides in Deland. Reach him by calling RE 4-0599.

Citrus Plant Breeding-A Fascinating And Profitable Venture For All Enterprising Citrus Growers

BY DONALD J. NICHOLSON

Any person growing citrus and desiring to create new and better possible varieties, can by a bit of patience, perseverence and work, develop for himself possibly a few valuable varieties, which endeavors may take from 7 to 18 years before such seedlings or as budded new types begin to produce their first fruits.

Such varieties as the KING ORANGE, TEMPLE ORANGE, MURCOTTE which is a hybrid, and many kinds of Navel Oranges from which all types will sometimes yield a few seeds, can be used for such promising research with full assurance that among SOME OF THESE SEEDLINGS will come types quite useful and promising for the citrus industry.

The writer has based his facts upon his own work in this rich field of endeavor, having produced no less than five types of free-peeling red-skinned "TANGERINES" from seedlings grown from the seeds of one King Orange tree planted among a small grove of mixed varieties of citrus.

I produced what I call a "GRAPEFRUIT-TEMPLE", which fruits are large and flat, red of skin with orange-red flesh, tender and melting, and of delicious flavor. The segments are extremely large rendering spooning out as a breakfast fruit. Tree vigorous, dark green, spreading, and quite prolific. Fruits attaining prime flavors by January.

Another type hybrid from seed of Temple Oranges was that of a new variety called the "THORNAL ORANGE." which fruits are much like the Temple Orange in shape and size, but quite unlike in coloration of peel and flesh. The flavor too is most pleasing and different. This hybrid is very prolific when grown upon sweet orange rootstocks, or sour orange stocks. Fruits of nice smooth texture and orange-red color, maturing a bit earlier than the Temple fruits.

It should be pointed out that there are two methods of obtaining improved types of citrus varieties; one, by exploring all groves in a constant search for any new and outstanding qualities among individual trees, which surely exist but yet unnoticed, and secondly, and extremely important, the selection of seeds from our very finest varieties of citrus fruits, in turn planting same, carefully marked for later historical report, and fruiting either as SEEDLINGS or budded trees or both, to determine the character of such fruits which may turn out extremely early, or late; beautiful skins, rich new flavors, seedless, etc. Moreover, many such seedlings are the result of field crossing between two different genera which results in the development of some of our most important new hybrid types.

Such experiments are both fascinating and profitable, but it should be remembered that time and patience are required to succeed, and one must of necessity be an optimist, and stick to it. There is no field so fruitful and full of promise as Citrus, and the young man, or middle-aged, can, if he has the will, make many useful future contributions to mankind, if only he applies himself. Use the pollinization technique in addition, if you will but this is not necessary, for fine results come from fruits in mixed plantings of varieties, which is a fertile field of exploration.

In closing let me state that had I not had abundant faith and hope, never would have been developed two very recent highly important varieties of what now appears to be the very earliest maturing seedless varieties of oranges yet developed as SEEDLING TYPES. These fine oranges attain ratios of as high as 12 to 1 by October first with high solids and adequate acidity. By late October the ratios go as high as 17 to 19 to 1, with solids of over 11, and .68 acidity, and 6 gallons of juice per gallon. And what is more important, are prolific and very beautiful fruits.

(Continued on page 21)

SAFETY AWARDS WON BY 10 4-H MEMBERS

Ten Florida 4-H boys and girls have been awarded $30 checks as county winners in the 1960 safety awards program. The award money will be used by the counties to further the safety program.

Pumpkin, squash and sweet potatoes — symbols of Fall and good eating—are native American foods, standard items of many American diets.

Research Planned On Responses Of Valencias To Microclimate, Particularly Temperature[1]

WILLIAM C. COOPER,[2] Ascension Peynado,[3] and J. R. FURR[4]
CROPS RESEARCH DIVISION
AGRICULTURAL RESEARCH SERVICE
U. S. DEPARTMENT OF AGRICULTURE
Presented at October, 1960 Horticultural Society Meeting

Introduction

Many of the rapid advances in recent years in citrus culture are due to finding correct nutrition, better pesticides, and the production and use of virus-free lines of commercial varieties. Today our citrus experiment stations are centers of research in nutrition, diseases, insects and nematodes.

These research projects require continued active support, as new problems on culture of citrus continue to develop. In the future, however, it seems likely that the greatest opportunity for further large advances in the production of citrus—whether it be for increased quality, greater yield, or greater cold hardiness—lies in a clear understanding of the widespread interrelation between growth-development-physiology of trees and the various elements of their climatic environment.

It appears possible that we stand this year at the beginning of a modest new era in our understanding and control of citrus tree growth, fruit production and fruit quality. This possibility is indicated by a small number of new facts which are accumulating on the way citrus trees sense and respond to temperature. These facts do not in themselves constitute a new era. Actually, they constitute just a gleam in the eyes of a few people, but they have suggested a concept which will be increasingly explored by citrus researchers and which may well extend our ability to cause citrus trees to do our bidding.

Definite climatic factors determine the areas in which and to what extent citrus can or cannot be grown economically. We know that crop yields in many of the citrus-growing regions are not limited by fertilization practices or diseases but by short periods of extreme cold.

This was clearly indicated by the great 1951 freeze that nearly wiped out the industry in the Rio Grande Valley of Texas. We know that citrus growing north of Ocala, Florida, is fairly hazardous from the standpoint of freezing weather.

Scientists in Texas started intensive cold-hardiness studies after the 1951 freeze (1, 3). These studies have continued since that date, and much of our knowledge concerning the cold hardiness of citrus in a known physiological condition has developed out of these studies.

Much of this work was reviewed in a paper presented before this Society last year (2). The work was expedited by the use of a portable freezer which permitted exposure of a young tree in the field to controlled freezing temperatures and permitted comparisons of cold hardiness of trees in specific physiological states. Two years ago the work was extended to include a large tree freezer capable of freezing a mature, bearing tree.

Work with this tree freezer is now in progress in Texas (5), and investigations with a freezer of similar type are now in progress at the University of Florida Citrus Experiment Station in Lake Alfred.

Freezing weather is not the only climatic factor controlling citrus tree growth, fruit production and quality. It is well known that citrus is variably suited to the limited area of the U. S. in which it can be grown. For instance, the Washington navel orange is grown mostly in southern California because in this area this variety of navel orange reaches peak quality.

Similarly, grapefruit reach top quality in Texas, lemons in California, and various sweet oranges and tangerines in Florida. The Valencia orange grows acceptably in all 3 areas. Why? The answer is climate, but we need to know what factors of climate are responsible.

The present paper describes research initiated during the past year to determine the climatic factors which affect tree growth, dormancy, and cold hardiness; fruit set, enlargement, and quality; and other characteristics of the tree which make varieties adapted to certain areas.

Citrus Climatological Stations

Investigations planned are concerned with the effect of climate on the growth-development of mature, bearing Valencia orange trees growing in the various citrus-growing regions of the United States. Ideally, it would be desirable to conduct such studies at one location on trees in bioclimatic chambers which simulate the climates of all the various citrus-growing regions of the United States.

Small young trees are now being studied in bioclimatic chambers,[5] but such studies on large, bearing trees are not now feasible because bioclimatic chambers which could accommodate large trees would be very expensive and are not yet available. The present studies, recording the microclimate of trees growing under grove conditions in the different citrus-growing regions of the United States, constitutes the logical first step to later more sophisticated studies in bioclimatic chambers.

If continued for 5 years, they should yield data on the microclimate as well as on tree behavior of citrus growing in the different citrus-growing regions of the United States.

The nine locations selected for climatological stations are as follows:

1. Orlando, Florida—Gibb's Grove near Ocoee, about 8 miles west of Orlando.
2. Clermont, Florida—Hartle's grove on the Ridge, 4 miles east of Clermont.
3. Weslaco, Texas—Rio Farms grove 20 miles north of Weslaco.
4. Phoenix, Arizona—University of

(Continued on page 16)

1—These investigations are conducted in cooperation with the Universities of California and Arizona. The authors acknowledge the assistance of G. A. Cahoon and Robert H. Hilgeman.

2—U. S. Horticultural Station, Orlando, Florida.

3—U. S. Fruit, Vegetable, Soil and Water Research Laboratory, Weslaco, Texas.

4—U. S. Date Field Station, Indio, California.

5—Unpublished data by Roger H. Young.

Now! A new quick-killing positive mite control for both oranges and grapefruit

NEW Ethion MITICIDE

For long-lasting control of *all* the major mite pests on oranges and grapefruit including citrus red mite, rust mite, Texas citrus mite, and other mite species.

Fully tested by citrus research specialists, this powerful new weapon against mites is made available commercially for the first time this season.

Economical—Ethion has proven itself an outstandingly effective miticide—yet it actually costs you less and can save you money on application. Because it can be applied on both oranges *and* grapefruit, Ethion saves by simplifying your program. And its extended residual activity spreads your spray dollars.

Harmless to Fruit—Ethion has no ill effect on developing fruit or foliage. It allows the fruit to develop fully and naturally for bumper crops with no spray damage.

Feed treated pulp—When Ethion is used according to label directions, treated pulp may be used for animal feeds.

Clean up mites fast – and keep them out; rely on this powerful new material. Fast-acting, long-lasting, gentle to your crop—new

Ethion

Technical Chemicals Department • Niagara Chemical Division • Food Machinery and Chemical Corporation, Middleport, New York

RESEARCH PLANNED ON RESPONSES OF VALENCIA ORANGES TO MICROCLIMATE, PARTICULARLY TEMPERATURE,

(Continued from page 14)

Arizona Citrus Experiment Station grove at Tempe, 15 miles west of Phoenix.

5. Indio, California—grove near Thermal, 15 miles south of Indio.

6. Riverside, California — University of California Citrus Experiment Station grove.

7. Santa Paula, California—Main Limoneira Ranch, 5 miles west of Santa Paula.

8. Ventura, California—Del Mar Limoneira Ranch, 10 miles west of main Limoneira Ranch and 5 miles from the Pacific Ocean.

9. Lindsey, California — Peterson grove.

Climatic Data

The standard meterological instrument installed at all stations except in Arizona is the Spot Climate Station (Fig. 1) developed by the University of California, Davis, California, and manufactured by P. E. Symens Manufacturing Co., Davis, California. These stations have a 4-pen Foxboro recorder which registers on weekly charts wet- and dry-bulb temperatures, black globe (solarimeter) temperature, and soil temperature (Fig. 2). The stations also have a 3-pen recorder for measuring wind direction and wind velocity.

The station at each location is installed in a missing-tree space in a Valencia orange grove. The wet-and dry-bulb thermometers, anamometer, and wind-direction instrument are installed 8 feet above ground. The weather conditions thus measured are those within the grove and not those above the trees.

A standard Weather Bureau rain gage and B. L. Livingston black and white ball atmometers are installed in a missing-tree area adjacent to the weather station (Fig. 1). Thermocouples also were installed at various level (8, 20 and 40 feet) above ground on a 40-foot pole, located in a missing-tree space in the grove (Fig. 3). Recordings of temperatures at these positions have identified the presence of air inversion layers and

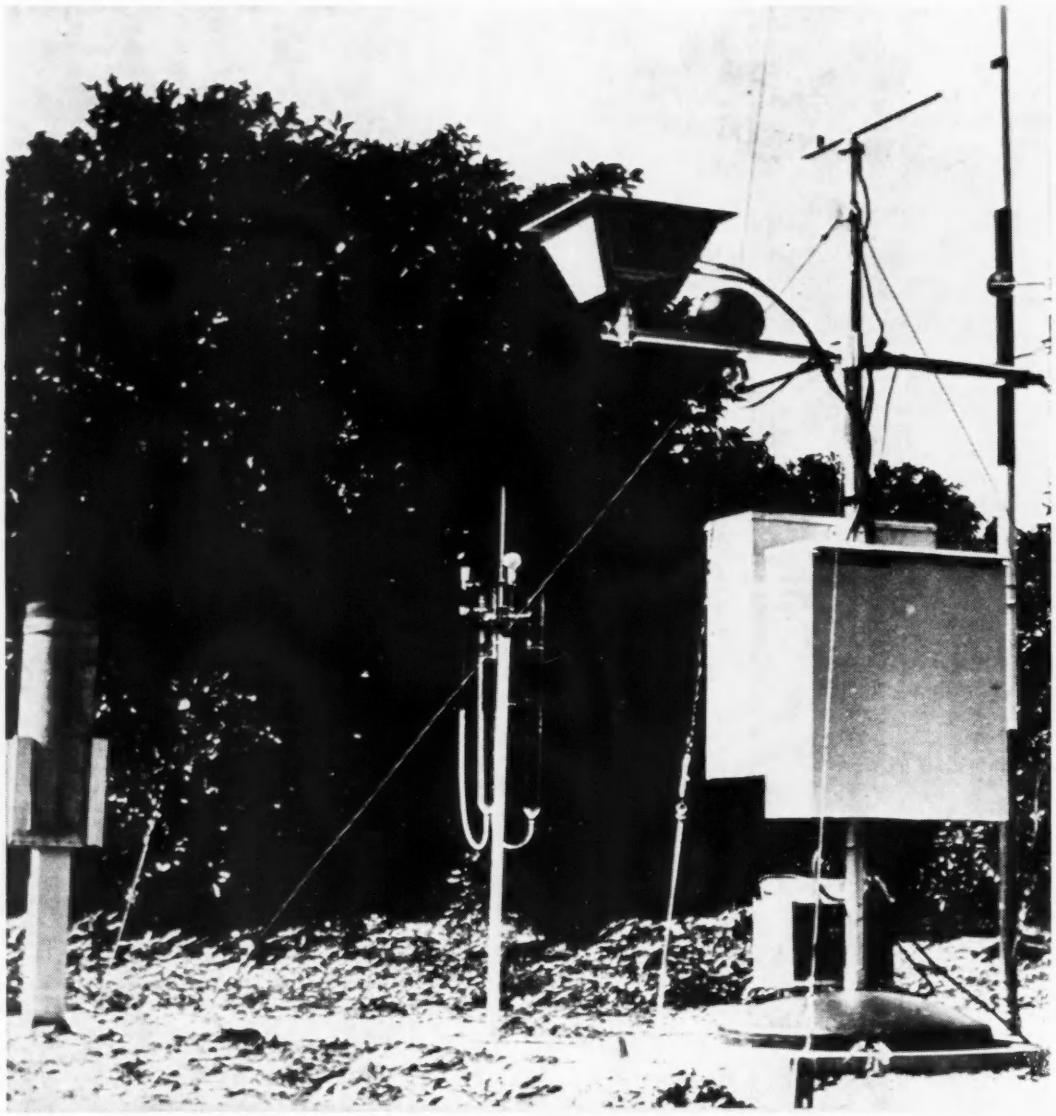


Fig. 1—The climatological station at Rio Farms near Weslaco, Texas, showing rain gage, black and white atmometers, and the Spot Climate Station. The Spot Climate Station records wet- and dry-bulb air temperaure, soil temperature, black ball solarimeter, wind direction, and wind velocity in the microenvironment of the tree. The tree in the background is one of 4 Valencia orange trees on which growth measurements are obtained.

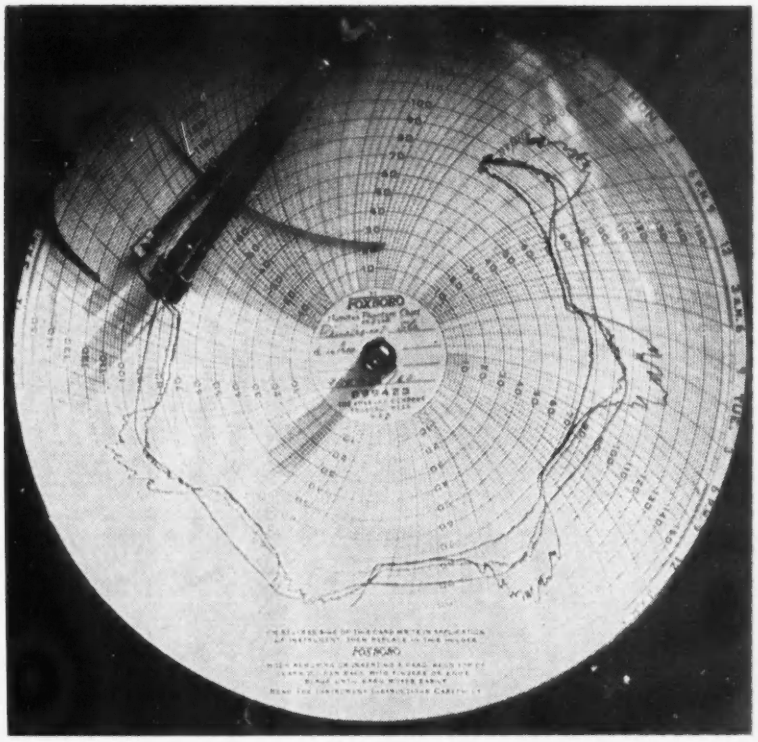


Fig. 2.—A 4-pen Foxboro instrument for recording wet- and dry-bulb temperature, and black ball temperature.

should aid in studies pertaining to freezing weather.

The Spot Climate Stations have been in operation in California for several years; at Weslaco, Texas, and Orlando, Florida, only since July 1960; and at Clermont, Florida, since October 1960. At Phoenix, Arizona, the Spot Climate Station is not being used, but similar data are being obtained from standard Weather Bureau instruments.

The climatological stations located in the groves as described record the microenvironment of the trees; i.e., the air conditions surrounding the trees. This microenvironment results from the climate above the trees and in surrounding areas without trees. The microenvironment, in turn, forms the microclimate; i.e., the climate of the leaves, fruit, twigs, branches, trunk and roots of the tree.

Micrometerological measurements are required to obtain the microclimate. In these investigations an attempt is made to measure the temperature of the tree microclimate at the Orlando, Florida, Weslaco, Texas, and Indio, California, stations by the use of a Minneapolis-Honeywell 16-thermocouple-point electronic recorder (Fig. 4). Recordings are made of temperatures of thermocouples inserted between two leaves held together with paper clips, under flaps of bark that have been taped, and in fruits.

A comparison of the microclimate of Valencia orange trees at the Orlando, Florida, Weslaco, Texas, and Indio, California, locations during a 28-day period in August and September is given in Tables 1-4.

At Orlando the temperature of the fruit was the same as that of the air during both day and night. Leaf temepatures, on the other hand, were considerably higher than air temperatures during the day and slightly lower than air temperatures at night (Table 1). The high leaf temperatures during the day are accounted for by radiant heat. The leaves were on the south side of the tree and were exposed to the sun during the middle of the day. The slightly lower temperatures of the leaves at night is caused by irradiation of heat from the leaves.

A comparison of temperatures for the 3 locations reveals generally higher temperatures during the day at Weslaco than at Orlando and higher at Indio than at Weslaco (Tables 2-4). Night temperatures, however were lowest at Orlando, next at Indio, and highest at Weslaco. The generally high fruit temperature at Weslaco

FAIRFIELD SLAG

The Ideal Soil Supplement

— Slag has been used as the principal soil amendment in Europe and the British Isles for 75 years.

— Slag has been ground for agricultural purposes in Birmingham, Alabama for 46 years.

— We are shipping the raw product from Tennessee Coal & Iron Div. of U.S. Steel in Birmingham, Ala., and grinding in our plant at Davenport, Florida.

— We are able to pass substantial saving to the grower.

— For complete information contact your fertilizer dealer or write.

FAIRFIELD OF FLORIDA AGRICULTURAL SLAG CORP.

Box 556, Lake Alfred, Florida **Phone FR 2-1560**

during both night and day in August and September may possibly be the climatic factor required to produce low-acid grapefruit. The unusually high leaf temperatures at Indio accounts for the leaf burning that occurs on citrus in that area.

Tree and Fruit Growth and Development Measurements

The present investigations were begun in February 1960; during the first season tree and fruit measurements were limited to 4 trees at each station and were mainly exploratory to determine what measurements were feasible. The trees were Valencia orange (approximately 20 years of age) on sour orange rootstock except at Indio, California, where sweet orange rootstock was used.

At the beginning of the next phenological year (time of spring flush on about February 1), tree and fruit measurements will be made on 3 blocks of 4 trees each at or near each of the climatological stations. At the Clermont, Florida, station, 3 blocks each of 4 trees of Valencia orange on sour orange and Valencia orange on rough lemon rootstocks will be used.

Exploratory work on tree and fruit measurements indicated striking differences in tree growth at the various stations. The largest increase in size of the trunk, branches and twigs occurred at Weslaco. Here, also, the summer and fall flushes of new growth were general all over the tree, whereas at the other locations they were spotty.

Although many dead twigs were present inside the outer canopy of foliage on trees in some of the California stations, this condition was not apparent at Weslaco, Texas, or at Orlando and Clermont, Florida. Tree and fruit growth data are not presented, as the effort along this line during the first season was to determine what measurements were desirable and feasible.

The essential features of the program planned for the trees at each of the climatological stations during the next 4 years are as follows: Measurements will be made on the same day at each location at 2-week intervals.

They will include number and length of new vegetative shoots; diameter of terminal spring flush shoots with and without summer flushes and with and without fruit; circumference of branches and trunk; degree of bark slipping of terminal shoots, branches, and trunk; fruit set count; fruit circumference; and flower, fruit, and leaf drop. Samples of twigs and bark of the trunk will be collected, killed, and fixed for later anatomical studies on cambial activity. A sample of fruit from each tree will be collected on March 1 and be analyzed for quality. Yield records will be obtained at the time of regular harvest at each location.

Discussion

The simultaneous accumulation of the micrometerological data and tree behavior data should facilitate a clearer understanding of the influence of the principal climatic factors. Do night temperatures, day temperatures, or the temperature summations influence growth and dormancy of the tree and growth and maturity of the fruit? When we know what these climatic factors are, we should be in a better position to forecast what effect year-to-year variations in weather will have on tree behavior and production.

Results of climatic studies on Valencia orange, however, cannot necessarily be applied to all citrus cultivars. Other sweet orange, grapefruit, and tangerine cultivars must be included.

After it is determined what climatic factors affect tree growth, dormancy, and so forth, we may ask ourselves: How can we keep a tree dormant under climatic conditions that favor growth? How can we produce good-quality summer oranges and good-quality navel oranges in Florida? How can we develop a low-acid grapefruit under climatic conditions that favor high-acid fruit.

It seems likely that the greatest opportunity for a solution to these problems lies in the improvement of the genetic constitution of the trees,

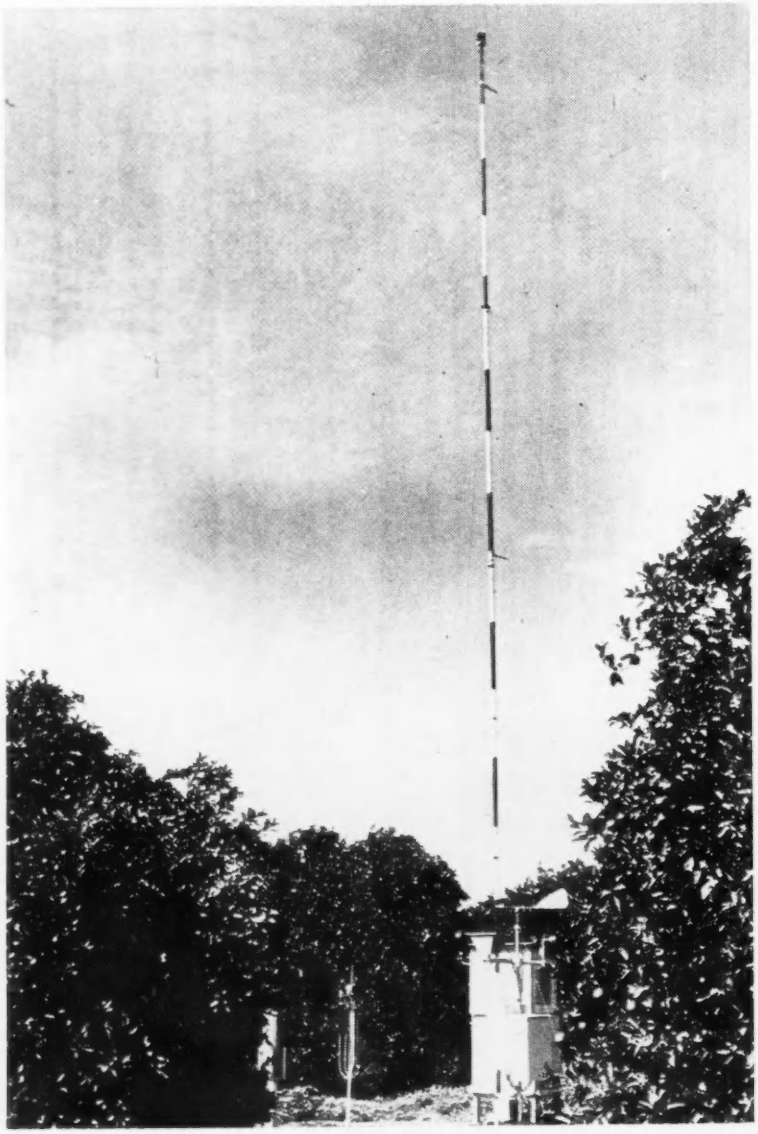


Fig. 3.—A 40-foot iron pole used for installation of thermocouples 20 and 40 feet above ground to record the temperature of the environment above the trees.

both varieties used as scions and those used as rootstocks.

Basic exploratory work to determine what parents are likely to produce trees and fruit of certain specialized types has been started or is planned. For example, it is known that growth of sweet orange varieties ceases and dormancy ensues when night temperatures drop below 55°F. for two weeks (4).

If warm weather prevails during the fall, the trees will continue to grow and be tender during December. Investigators[5] now are finding that citrus species and cultivars vary in regard to minimum night temperatures required for cessation of growth. Types of citrus that cease growth at temperatures above 50°F., when used as rootstocks, may induce early dormancy in the scion variety and thereby increase its cold hardiness.

Early dormancy, however, is only one of many characteristcis required in a satisfactory rootstock. By hybridizing early-dormancy types with nematode-tolerant and other desirable types, rootstocks may be tailored for warm falls. When crosses that produce trees of the types desired are found, additional crosses will be made to obtain larger numbers in order to increase greatly the chances of obtaining superior rootstocks. Thus, by integrating the citrus breeding work with climatological studies, it should be possible to combine favorable characters of several types of citrus into a variety adaptable to any particular climate.

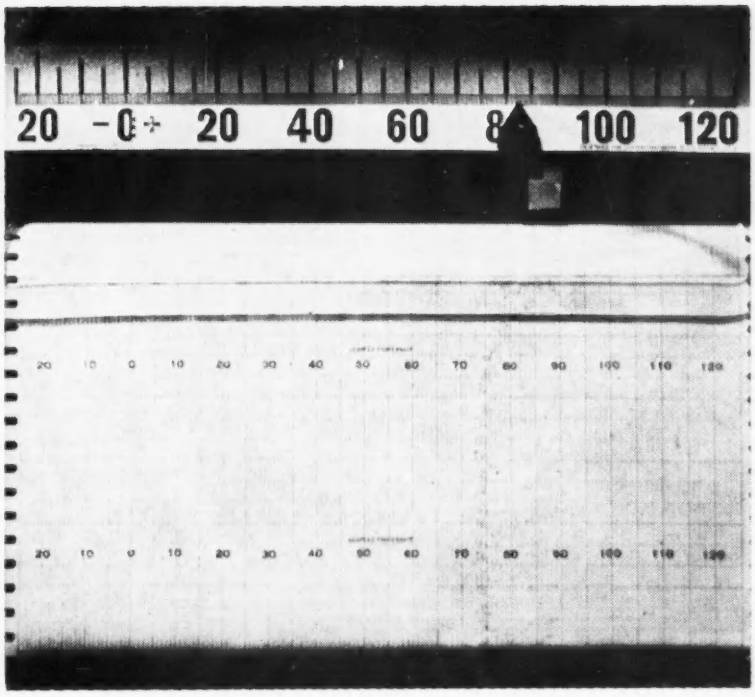


Fig. 4.—Minneapolis-Honeywell electronic recorder which records every 32 minutes the temperatures from 16 thermocouple points located in the bark, fruit, leaves, and air of the tree.

5—Ibid.

LITERATURE CITED

1. Cooper, W. C. 1952. Influences of rootstock on injury and recovery of young trees exposed to the freezes of 1950-51 in the Rio Grande Valley. Proc. Rio Grande Valley Hort. Inst. 6:16-24.
2. ————————. 1959. Cold hardiness in citrus as related to dormancy. Proc. Fla. State Hort. Soc. 72:61-66.
3. ————————, B. S. Gorton and Sam Tayloe. 1954. Freezing tests with small trees and detached leaves of grapefruit. Proc. Am. Soc. Hort. Sci. 63:167-172.
4. Webber, H. J. 1943. Plant characteristics and climatology. H. J. Webber and L. D. Bachelor, ed. The Citrus Industry, Vol. 1. Univ. Calif. Press. Berkeley and Los Angeles, pp. 41-70.
5. Young, R. H., A. Peynado and W. C. Cooper. 1960. Effect of rootstock-scion combination and dormancy on cold hardiness of citrus. Jour. Rio Grande Valley Hort. Soc. 14:58-65.

Table 1.—Air, fruit, and leaf temperatures on the south side of a Valencia orange tree at the Orlando, Florida, climatological station for the August 19–September 15, 1960, (28 days) period.

Temperature value[a] and night or day period[b]	Air	Fruit	Leaf
	°F.	°F.	°F.
Average minimum:			
Night	71	71	70
Day	71	71	71
Average maximum:			
Night	77	77	76
Day	87	87	99
Average:			
Night	73	73	71
Day	79	79	83

a—The electronic recorder recorded the temperature every 32 minutes for the 28-day period. The average minimum value is the average of the daily minimum temperature for the night or the day period. Likewise, the average maximum value is the average of the daily maximum temperature for the night or the day period. The average temperature value is the average of the temperature recorded every 32 minutes for the 28-day period.

b—The night period represents the time between one-half hour after sunset and one-half hour before sunrise, which approximates the dark period of the 24-hour day. The day- or light-period represents the remainder of the 24-hour period.

Table 2.—Air temperatures on the south side of a Valencia orange tree at the Orlando, Florida, Weslaco, Texas, and Indio, California, climatological stations for the August 19–September 15, 1960, (28 days) period.

Temperature value[a] and night or day period[b]	Orlando Florida	Weslaco Texas	Indio Calif.
	°F.	°F.	°F.
Average minimum:			
Night	71	74	67
Day	71	76	67
Average maximum:			
Night	77	80	83
Day	87	102	113
Average:			
Night	73	76	75
Day	79	88	92

a—The electronic recorder recorded the temperature every 32 minutes for Orlando and Weslaco and every 48 minutes for Indio for the 28-day period. The average minimum value is the average of the daily minimum temperature for the night or the day period. Likewise, the average maximum value is

(Continued on page 21)

SOUTHERN DOLOMITE
PALMETTO, FLORIDA
PHONE: BRADENTON 2-1411

CITRUS YIELD PER TREE BY ACRE . . .

(Continued from page 11)

41	6.0	11.0	4.0
42	6.0	11.0	4.0
43	6.0	11.0	4.0
44	6.0	11.0	4.0
45	6.0	11.0	4.0
46	6.0		4.0
47	6.0		4.0
48	6.0		4.0
49	6.0		4.0
50	6.0		4.0
51	6.0		4.0
52	6.0		4.0
53	6.0		4.0
54	6.0		4.0
55	6.0		4.0

Table 3. LATE ORANGE YIELD IN BOXES PER TREE

Age of Tree	Average	High	Low
1			
2			
3	.4	.6	
4	.7	.9	.3
5	1.0	1.3	.5
6	1.4	1.6	.7
7	1.7	2.0	.9
8	1.9	2.3	1.1
9	2.2	2.6	1.2
10	2.5	3.0	1.4
11	2.7	3.3	1.5
12	3.0	3.7	1.7
13	3.2	4.0	1.8
14	3.4	4.3	1.9
15	3.7	4.6	2.1
16	3.9	4.9	2.2
17	4.1	5.2	2.3
18	4.3	5.5	2.4
19	4.5	5.8	2.5
20	4.6	6.1	2.6
21	4.7	6.4	2.7
22	4.9	6.7	2.7
23	5.0	6.9	2.8
24	5.1	7.1	2.9
25	5.2	7.4	2.9
26	5.2	7.6	3.0
27	5.3	7.8	3.0
28	5.4	8.0	3.1
29	5.4	8.2	3.1
30	5.5	8.3	3.1
31	5.5	8.5	3.2
32	5.5	8.6	3.2
33	5.5	8.7	3.3
34	5.5	8.8	3.3
35	5.5	8.9	3.3
36	5.5	8.9	3.3
37	5.5	9.0	3.3
38	5.5	9.0	3.4
39	5.5	9.0	3.4
40	5.5	9.0	3.4
41	5.5	9.0	3.4
42	5.5	9.0	3.5
43	5.5	9.0	3.5
44	5.5	9.0	3.5
45	5.5	9.0	3.5
46	5.5		3.5
47	5.5		3.5
48	5.5		3.5
49	5.5		3.5
50	5.5		3.5
51	5.5		
52	5.5		
53	5.5		
54	5.5		
55	5.5		

Table 4. SEEDY GRAPEFRUIT YIELD IN BOXES PER TREE

Age of Tree	Average	High	Low
1			
2			
3	.5	1.0	
4	1.3	2.0	
5	1.9	2.9	.3
6	2.5	3.8	.6
7	3.1	4.6	.8
8	3.5	5.3	1.0
9	4.0	6.0	1.3
10	4.4	6.6	1.5
11	4.8	7.1	1.7
12	5.2	7.6	1.9
13	5.5	8.1	2.2
14	5.8	8.5	2.4
15	6.1	8.9	2.6
16	6.3	9.3	2.8
17	6.6	9.7	3.1
18	6.8	10.0	3.3
19	7.0	10.3	3.5
20	7.2	10.6	3.7
21	7.4	10.9	3.9
22	7.6	11.2	4.0
23	7.8	11.4	4.2
24	8.0	11.6	4.4
25	8.2	11.8	4.6
26	8.3	12.0	4.8
27	8.4	12.2	4.9
28	8.5	12.3	5.0
29	8.6	12.4	5.2
30	8.7	12.6	5.3
31	8.8	12.7	5.5
32	9.0	12.8	5.6
33	9.1	12.9	5.7
34	9.2	13.0	5.8
35	9.3	13.1	5.9
36	9.3	13.1	6.0
37	9.4	13.2	6.1
38	9.5	13.3	6.2
39	9.6	13.4	6.3
40	9.6	13.4	6.3
41	9.7	13.4	6.4
42	9.7	13.4	6.4
43	9.7	13.4	6.5
44	9.8	13.5	6.5
45	9.8	13.5	6.5
46	9.9	13.5	6.5
47	9.9	13.5	6.5
48	9.9	13.5	6.5
49	10.0	13.5	6.5
50	10.0	13.5	6.5
51	10.0	13.5	6.5
52	10.0	13.5	6.5
53	10.0	13.5	6.5
54	10.0	13.5	6.5
55	10.0	13.5	6.5

Table 5. SEEDLESS GRAPEFRUIT YIELD IN BOXES PER TREE

Age of Tree	Average	High	Low
1			
2			
3	.5	1.0	
4	1.1	1.7	.2
5	1.7	2.4	.5
6	2.2	3.0	.7
7	2.7	3.5	1.0
8	3.2	4.1	1.2
9	3.6	4.7	1.5
10	4.0	5.2	1.7
11	4.3	5.7	2.0
12	4.7	6.1	2.2
13	5.0	6.6	2.4
14	5.3	7.0	2.6
15	5.5	7.4	2.8
16	5.7	7.8	3.0
17	6.0	8.2	3.2
18	6.2	8.6	3.4
19	6.4	8.9	3.5
20	6.6	9.2	3.7
21	6.8	9.5	3.9
22	6.9	9.8	4.0
23	7.1	10.0	4.2
24	7.3	10.3	4.3
25	7.4	10.5	4.4
26	7.5	10.7	4.5
27	7.6	10.9	4.6
28	7.7	11.1	4.7
29	7.7	11.2	4.8
30	7.8	11.4	4.8
31	7.8	11.5	4.9
32	7.9	11.6	4.9
33	7.9	11.7	4.9
34	7.9	11.8	5.0
35	8.0	11.9	5.0
36	8.0	11.9	5.0
37	8.0	11.9	5.0
38	8.0	12.0	5.0
39	8.0	12.0	5.0
40	8.0	12.0	5.0
41	8.0	12.0	5.0
42	8.0	12.0	5.0
43	8.0	12.0	5.0
44	8.0	12.0	5.0
45	8.0	12.0	5.0

Table 6. TANGERINE YIELD IN BOXES PER TREE

Age of Tree	Average	High	Low
1			
2			
3		1.0	
4	.1	1.3	
5	.5	1.7	
6	.9	2.0	.1
7	1.2	2.3	.2
8	1.5	2.6	.4
9	1.8	2.9	.6
10	2.1	3.2	.7
11	2.3	3.5	.9
12	2.5	3.8	1.0
13	2.8	4.2	1.1
14	3.0	4.5	1.3
15	3.2	4.8	1.4
16	3.4	5.1	1.5
17	3.6	5.3	1.7
18	3.7	5.6	1.8
19	3.9	5.9	1.9
20	4.0	6.2	2.0
21	4.2	6.5	2.1
22	4.3	6.8	2.2
23	4.4	7.1	2.3
24	4.5	7.4	2.4
25	4.6	7.6	2.5
26	4.7	7.8	2.6
27	4.8	8.1	2.7
28	4.9	8.3	2.8
29	5.0	8.5	2.9
30	5.1	8.8	3.0
31	5.1	9.0	3.1
32	5.2	9.2	3.1
33	5.2	9.4	3.2
34	5.3	9.6	3.3
35	5.3	9.7	3.3
36	5.3	9.9	3.4
37	5.4	10.0	3.4
38	5.4	10.1	3.4
39	5.4	10.2	3.4
40	5.5	10.3	3.5
41	5.5	10.4	3.5
42	5.5	10.5	3.5
43	5.5	10.5	3.5
44	5.5	10.5	3.5
45	5.5	10.5	3.5

Table 7. TEMPLE ORANGE YIELD IN BOXES PER TREE

Age of Tree	Average	High	Low
1			
2			
3	.5	1.2	
4	.7	1.5	.1
5	1.0	1.8	.2
6	1.2	2.0	.4
7	1.4	2.3	.5
8	1.6	2.6	.7
9	1.8	2.8	.8
10	2.0	3.1	.9
11	2.3	3.3	1.1
12	2.5	3.6	1.2
13	2.7	3.8	1.3
14	2.8	4.1	1.5
15	3.0	4.3	1.6

16	3.2	4.6	1.7
17	3.4	4.8	1.8
18	3.6	5.0	2.0
19	3.8	5.3	2.1
20	4.0	5.5	2.2
21	4.2	5.7	2.4
22	4.4	5.9	2.5
23	4.5	6.1	2.6
24	4.7	6.3	2.7
25	4.9	6.5	2.9
26	5.0	6.7	3.0
27	5.2	6.8	3.1
28	5.3	7.0	3.2
29	5.5	7.2	3.3
30	5.6	7.3	3.4
31	5.8	7.5	3.5
32	5.9	7.6	3.6
33	6.0	7.7	3.7
34	6.2	7.8	3.8
35	6.3	8.0	3.9
36	6.4	8.1	4.0
37	6.5	8.2	4.1
38	6.6	8.3	4.2
39	6.7	8.3	4.3
40	6.8	8.4	4.3
41	6.9	8.5	4.4
42	7.0	8.6	4.4
43	7.0	8.6	4.4
44	7.0	8.6	4.5
45	7.0	8.7	4.5

RESEARCH PLANNED ON RESPONSES OF VALENCIA ORANGES TO MICROCLIMATE, PARTICULARLY TEMPERATURE

(Contiuued from page 19)

the average of the daily maximum temperature for the night or the day period. The average temperature value is the average of the temperature recorded every 32 minutes for Orlando and Weslaco and every 48 minutes for Indio, for the 28-day period. b—The night period represents the time between one-half hour after sunset and one-half hour before sunrise, which approximates the dark period of the 24-hour day. The day- or light-period represents the remainder of the 24-hour period.

Table 3.—Fruit temperatures on the south side of a Valencia orange tree at the Orlando, Florida, Weslaco, Texas, and Indio, California, climatological stations for the August 19–September 15, 1960 (28 days) period.

Temperature valuea and night or day periodb	Orlando Florida °F.	Weslaco Texas °F.	Indio Calif. °F.
Average minimum:			
Night	71	77	70
Day	71	78	68
Average maximum:			
Night	77	83	86
Day	87	98	100
Average:			
Night	73	79	77
Day	79	88	88

a—Same as footnote a of Table 2.
b—Same as footnote b of Table 2.

Table 4.—Leaf temperatures on the south side of a Valencia orange tree at the Orlando, Florida, Weslaco, Texas, and Indio, California, climatological stations for the August 19–September 15, 1960, (28 days) period.

Temperature valuea and night or day periodb	Orlando Florida °F.	Weslaco Texas °F.	Indio Calif. °F.
Average minimum:			
Night	70	75	67
Day	71	76	67
Average maximum:			
Night	76	80	83
Day	99	103	126
Average:			
Night	71	76	75
Day	83	88	96

a—Same as footnote a of Table 2.
b—Same as footnote b of Table 2.

CITRUS PLANT BREEDING A FASCINATING AND PROFITABLE VENTURE FOR ALL ENTERPRISING CITRUS GROWERS

(Continued from page 13)

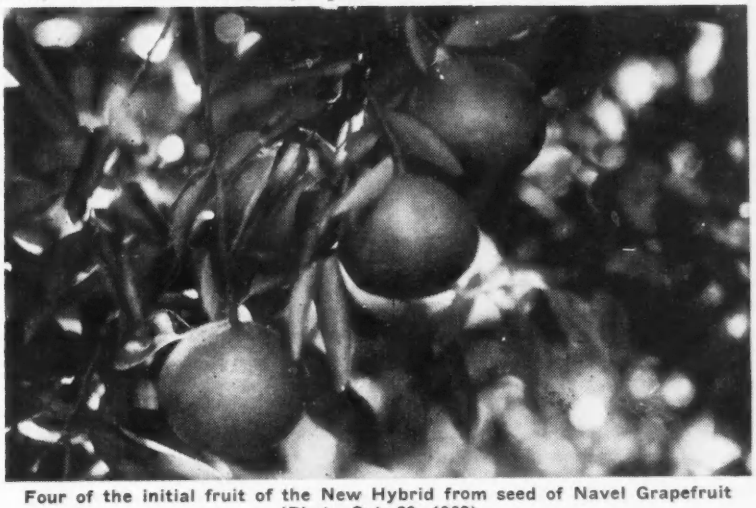
First Fruits of A New Hybrid — A Field or Natural Crossing of Dancy Tangerine and Navel Grapefruit

About 15 years ago I came by some budwood of a very unique type grapefruit, which lone tree always produced a fine crop of grapefruit, all of which developed a true navel at the apex of each fruit.

In the year 1950 I planted a number of seeds from these Naveled Grapefruits, which by the way is the only such type known in the world, and only one among the lot of such plants produced a seedling quite unlike the remainder which were of typical grapefruit characteristics as to leaf-structure with aproned, over-lapping petioles.

There being a Dancy tangerine fruiting tree close by the navel grapefruit pollen was mixed and resulted in this new hybrid type, which is a mixture of navel orange, Duncan grapefruit and Dancy tangerine.

In February 1960 only one branch of some five or six others top-worked on a grapefruit tree, produced 22 bloom, and four of these flowers produced these four fine, heavy fruits on maturing on this tree on November 8, 1960. Such fruits "broke color" about a week previous and appear to be fast approaching maturity.



Four of the initial fruit of the New Hybrid from seed of Navel Grapefruit (Photo Oct. 29, 1960)

No one appears to know the history of the parent type of Navel grapefruit, but it certainly has navel orange and grapefruit parentage in my opinion, and this is borne out by the fact that the flowers of this unique naveled type grapefruit produces pollenless flowers 100 per cent each year.

The temptation is strong to cut and examine the interior of one of these new hybrid fruits, but since there are but these four precious fruits, the first ever produced by the very first blooming of the type, it seems best

(Continued on page 26)

BEST GROWERS AGREE . . . GROW WITH GULF!

During this time of year, growers should follow a regular schedule of fertilization for young citrus trees. Ask your Gulf Representative for expert advice on fertilizer and pesticide problems.

THE GULF FERTILIZER COMPANY

Tampa, Florida

SERVING FLORIDA AGRICULTURE FOR 57 YEARS

FRIENDLY GULF FERTILIZERS and pesticides

176667

ADVERTISEMENT — LYONS FERTILIZER COMPANY

The LYONIZER

COMPILED BY THE LYONS FERTILIZER COMPANY

Reports Of Our Field Men . . .

SOUTH HILLSBOROUGH, MANATEE AND SARASOTA COUNTIES

R. C. Revels, Jr.
P. O. Box 3332, Apollo Beach, Fla.

Tomato fields look very good at this time. Most of the plants are stake high and have a good color. Some of the growers will pick a few crates this week, however most of the farmers are pointing to December 1st as picking day. Tomato packing houses are making ready for what is hoped will be a good fall season.

Potato growers have completed planting by now and the potato fields are taking on a dark green color. There doesn't seem to be any disease in the potatoes, however, the fields are still young. Cabbage fields are beginning to take shape now and most of the early plantings look very good.

With the cool weather, rains have been few and the citrus groves are getting a little dry. There isn't any wilting yet, but a rain would help citrus a lot. Most of the groves have a start of mites now and a close watch should be made in case they get bad enough to warrant spraying earlier than usual.

Most growers are getting ready to bank the young trees against cold weather later this fall. Care should be taken to put Chlordane or DDT in the banks to stop the wood lice that might damage the young tree trunks while in the bank.

Where sand might blow during wintery winds, a good winter cover crop should be planted by the last of November.

Always remember that your Lyons Field Representative stands ready to help you with vegetable or citrus problems, please call on him.

SOUTH POLK, HIGHLANDS, HARDEE AND DeSOTO COUNTIES

C. R. Wingfield
Phone: Glendale 3-4537
Avon Park, Fla.

The cleanup from hurricane Donna is almost complete except those trees that are holding fruit. As soon as the fruit is picked they will be pulled out. Most groves are being disked and the cover crop worked into the soil.

There has been almost no rain so far during November and with tree roots near the ground surface they are beginning to need moisture. A break in foliage color is now showing and fertilizer is being applied. Replacement of all elements should be carefully considered.

Fruit movements have been below normal up to this time and appears to be slow in maturing. The cool nights have caused fruit to break color very nicely which will aid in packing house coloring. Prices are holding fairly good and look encouraging for the season.

Since the weather changed from rains every day the mites of all kinds have begun to show up and a constant watch should be made and a miticide selected to best control all insects. Rust mites have shown up in large numbers.

Vegetable growers over the southern part of the state have been marketing their crops. Yields have not been too good. Cukes are nearing an end in this section but further south they are just coming in, as of this date (11-15). Tomatoes are just beginning and squash are plentiful.

WEST HILLSBOROUGH, PASCO AND PINELLAS COUNTIES

Calvin P. Lloyd, III
Tampa, Fla.

The groves in this area of the state look very good with these past few cooler days and much needed dryer weather.

The citrus grower in this area has been plagued with split fruit, which most authorities attribute to the overabundance of water supplied us this year. Since the rains have let up the splitting has stopped in most groves.

The fruit is coloring up and the ratio and sugar content is becoming more favorable, thus the fruit is beginning to move in greater volume.

The rust mites are now coming back forcing most growers to spray again. The red mites and six-spotted mite are showing up in a few groves and if it stays dry could pose quite a problem.

The fall season is now full upon us and most growers are cleaning up their groves for the winter. When the fertilizer is cut under, the young trees should all be hoed and the banks put up within the next few weeks.

HILLSBOROUGH, PASCO AND SUMTER COUNTIES

C. W. Dean
Gibsonton, Fla.
Phone Tampa 40-2592

At this time all crops are looking good. Oranges have begun to move some, but it will be another couple of weeks before they start moving at a steady scale as citrus are approximately three weeks late this season.

Vegetable crops are looking good with squash and peas as well as okra moving regularly. Prices are fair on most varieties of row crops.

Strawberries are looking good with most growers either applying or have already applied plastic to them. Most growers are using plastic this season.

It does a good job in several different ways. It holds the grass down to a minimum. It keeps the fertilizer from leaching so bad. The quality of the berries is better as it holds the culls to a minimum. It seems to be an investment well spent by the growers. Most growers could use some rain as it is beginning to get dry in most sections.

As the season is shaping up, all prospects for a prosperous season for both citrus and vegetable grower look good. For top prices on the different commodities we need quality. For top quality, Lyons fertilizer is the answer.

NORTH CENTRAL FLORIDA

V. E. Bourland
Winter Garden, Fla.
Phone 107

We are having nice weather, some rain would help in some sections, while low lands are still wet.

Quite an amount of fruit being picked, cool weather is coloring it up nicely. Some tangerines are being picked, but very small amount passing the test. Most groves have plenty of red spider, Texas, and rust mite. Most groves being fertilized, cover crop has been worked in, young trees being banked.

Uncle Bill Says:

It may be a little bit early to wish all our friends a MERRY CHRISTMAS and a HAPPY NEW YEAR, but if we wait until next month it will be a little too late. . .so in extending these greetings we believe that no one will feel that we are just being polite. . .for we mean them from the bottom of our heart.

Your patronage and friendship over the past year has been highly satisfactory and has made the year 1960 a good year for us. . . we are truly grateful.

Of course, hurricane Donna sort of played hob with some of our groves, 'specially with some grapefruit groves, but as a whole this year just coming to a close has been a purty good year, and causes us to remind you again that us citrus growers is mighty fortunate to be in the business in which we are engaged.

Indeed we are fortunate to live in a country like ours, where in spite of our many differences and the varied opinions which are to be found in business, labor, communities, families and in many other things, each of us know subconsciously that we are far better off than any other nation in the world.

So, again we say, "May the year 1961 be the best you have ever enjoyed and may the world find a greater degree of tolerance and individuals find the real meaning of brotherly love and peace of mind."

A COMPARISON OF MAGNESIUM SOURCES FOR YOUNG ORANGE TREES

(Continued from page 10)

critical magnesium level as found in this experiment where practically no magnesium deficiency symptoms were found in plots which contained more than 0.33 percent Mg in July.

According to the rating system used in this experiment a rating of one is indicative of two or three leaves per tree with a magnesium deficiency pattern; whereas, an average rating of 0.5 indicates that approximately one-half of the trees have two or three leaves with a magnesium deficiency pattern. This is not an unusual or necessarily undesirable occurrence in a grove carrying a heavy crop of fruit. Reuther and Smith (10) and Smith et al. (11) reported that slight magnesium deficiency symptoms did not influence, appreciably, growth or fruiting, and there appeared to be no advantage in supplying magnesium in excess of that needed to prevent visible deficiency symptoms. It is concluded, therefore, that a magnesium content of approximately 0.3 percent or above in four to seven month old spring flush leaves on non-fruiting twigs would probably be an adequate magnesium level to prevent occurrence of magnesium deficiency symptoms. Below this level, deficiency symptoms may occur, especially in years of heavy crop strain. Yield data were insufficient to indicate the desirable magnesium level from the standpoint of optimum fruit yields. However, there is no reason to believe that this value will be appreciably different in older trees which bear appreciably greater quantities of fruit.

The soil analyses data indicate that there definitely is a relationship between the amount of extractable magnesium in the soil and the amount taken up by the tree. Soil analysis, therefore, is a helpful guide in predicting whether or not additional magnesium should be applied, but undoubtedly is not as reliable in predicting whether or not magnesium deficiency symptoms will appear as is the leaf magnesium level. The relationship between leaf magnesium level and magnesium deficiency rating should hold regardless of crop size since crop size would already be established at leaf sampling time. If a heavy crop were set, the leaf magnesium content would be relatively low and the magnesium deficiency rating would be relatively high. Therefore, a certain level of leaf magnesium in July would result in approximately the same degree of magnesium deficiency regardless of crop size, whereas, a specific soil magnesium level may or may not result in a definite deficiency rating or leaf magnesium level, depending upon soil sampling date, crop strain, leachability of the magnesium, and any other factor affecting magnesium uptake from the soil.

Summary and Conclusions

Four sources of magnesium—sea water magnesia, Emjeo, olivine and dolomite—were compared at three rates of application to young Valencia and Pineapple orange trees growing on previously unlimed, virgin Lakeland fine sand. Two relatively insoluble sources of magnesium, dolomite and olivine were applied at two rates broadcast with no additional magnesium in the fertilizer. Tree growth was not affected by differential rates or sources of magnesium. Under the conditions of this experiment, sea water magnesia was the best source of magnesium, closely followed by Emjeo. Dolomite was somewhat less available than Emjeo. Olivine proved to be a relatively poor source of magnesium.

Dolomite applied at the rate of 2,340 pounds per acre broadcast with no additional fertilizer magnesium appeared to be sufficient as the only magnesium supply for the first seven years of growth in the field. This treatment resulted in no magnesium deficiency symptoms until the sixth year, and very few symptoms during this relatively heavy crop year.

The leaf magnesium content and magnesium deficiency symptoms would indicate that a leaf level of 0.33 percent Mg in July would result in no magnesium deficiency symptoms during that crop year, even though no additional magnesium were applied subsequent to the leaf sampling.

Bibliography

1. Bryan, O. C. and E. F. Debusk. Citrus bronzing—a magnesium deficiency. Fla. Grower 44 (2): 6, 24. 1936.
2. Camp, A. F. et al. Citrus nutrition studies. Fla. Agr. Exp. Sta. Ann. Report 1946: 153. 1947: 148.
3. Fudge, B. R. Relation of magnesium deficiency in grapefruit leaves to yield and chemical composition of fruit. Fla. Agr. Exp. Sta. Bul. 331: 1-36. 1939.
4. Fudge, B. R. Citrus nutrition studies. Fla. Agr. Exp. Sta. Ann. Report 1940: 153-155.
5. Fudge, B. R. Early diagnosis of magnesium deficiency in citrus. Proc. Fla. State Hort. Soc. 55: 17-21. 1942.
6. MacIntire, W. H., L. J. Hardin, and H. S. Johnson, Jr. Development of available magnesia—results of reactivity of concentrated superphosphate in mixtures with olivine, serpentine, magnesite, and their calcines. Ind. Eng. Chem. 41: 1079. 1949.
7. Mehlich, A. Improvements in the colorimetric magnesium and ammonium methods with sodium polyacrylate. J. Assoc. Offic. Agr. Chemists 39: 518-523. 1956.
8. Peech, M. Citrus nutrition studies. Fla.

You need a BATH! YES, A WORLD-FAMOUS HOT SPRINGS THERMAL BATH

If you're healthy, you'll probably live longer because as it's said, "an ounce of prevention is worth a pound of cure." If you're nervous, tired, rundown or stiff from rheumatism and atthritis, you can find relief as thousands of others have. *You'll find the best at The Majestic* where you can go from your room to the bathhouse in robe and slippers. Here you will find specialists who know their business—experienced attendants and masseurs for the men and masseuses for the ladies—all licensed in accordance with the regulations under the Director of the Nat'l Park Service, U. S. Dep't of the Interior.

THE Majestic HOT SPRINGS NATIONAL PARK ARKANSAS

HOTEL & BATHS

ROOMS from—$4.50 per day single $6—double. and you can budget MEALS at $4.50 per day

Write the MAJESTIC today!

Agr. Exp. Sta. Ann. Report 1940: 148-151.

9. Reitz, H. J., C. D. Leonard, J. W. Sites, W. F. Spencer, I. Stewart, and I. W. Wander. Recommended fertilizers and nutritional sprays for citrus. Fla. Agr. Exp. Sta. Bul. 536. 1954.
10. Reuther, W. and P. F. Smith. Relation of nitrogen, potassium, and magnesium fertilization to yield, leaf composition, and the incidence of zinc deficiency in oranges. Proc. Amer. Soc. Hort. Sci. 59: 1-12. 1952.
11. Smith, P. F., W. Reuther, and G. E. Scudder, Jr. Effects of differential supplies of nitrogen, potassium, and magnesium on growth and fruiting of young Valencia orange trees in sand culture. Proc. Amer. Soc. Hort. Sci. 61: 38-48. 1953.
12. Tail, W. L. Some field tests with magnesium sources. Proc. Fla. State Hort. Soc. 49: 9-14. 1936.
13. Wander, I. W. Availability of phosphorus, potassium, and magnesium from insoluble sources as indicated by the growth and leaf analysis of sweet orange seedlings. Proc. Fla. State Hort. Soc. 67: 60-66. 1954.
14. Willson, A. E. Rapid 8-quinolinol procedure for determination of magnesium. Anal. Chem. 23: 754.

STATE OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946, OF THE CITRUS INDUSTRY, PUBLISHED MONTHLY AT BARTOW, FLORIDA, FOR OCTOBER, 1960.

STATE OF FLORIDA, COUNTY OF POLK.

Before me, a notary public in and for the State and County aforesaid, personally appeared S. Lloyd Frisbie, who having been duly sworn according to law, deposes and says that he is the Editor of The Citrus Industry and that the following is to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation) etc. of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March, 1922, embodied in Section 537, Postal Laws and Regulations, printed on the reverse side of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher — Associated Publications Corp., Bartow, Fla.
Editor—S. Lloyd Frisbie, Bartow, Fla.
Business Manager — S. Lloyd Frisbie, Bartow, Florida.

2. That the owners are:
Associated Publications Corporation, Bartow, Florida.
S. Lloyd Frisbie, Bartow, Fla.
Loyal Frisbie, Bartow, Fla.
Richard R. Frisbie, Bartow, Fla.
Mrs. Clara Frisbie, Bartow, Fla.
B. L. Gable, New York, N. Y.
F. L. Skelly, Orlando, Fla.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:
None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholders or security holders appears upon the books of the company as trustee or in any other fiducary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was 4546.

Sworn to and subscribed before me this 17th day of November, 1960.

S. LLOYD FRISBIE, Bus. Mgr.

MARY H. DUNSTON, Notary Public
My commission expires Nov. 1, 1964.

FF&V ASSOCIATES CALL FOR INCREASE IN MARKETING QUOTA FOR MAINLAND SUGAR

The Board of Directors of the Florida Fruit & Vegetable Association has adopted a resolution calling for an increase in the marketing quota of the Mainland Cane Sugar Area, according to J. P. Harllee, Jr., Palmetto, president of the growers' organization. Sugar producing states are Florida and Louisiana.

In the opinion of the Directors of the Florida Fruit & Vegetable Association, the United States of America should never again depend upon offshore foreign countries for nearly one-half of our nation's sugar requirements and should never again jeopardize its supply of a household necessity by depending upon any one foreign country for approximately one-third of annual sugar requirements.

The obvious answer is permit the expansion of the domestic sugar industry, consistent with marketing needs, and the segments of the industry in a position to expand promptly should be encouraged to do so by every possible means, including revision of marketing quotas upward," said Harllee.

"Copies of the Resolution have been sent to the Secretary of State of the United States; the Secretary of Agriculure of the United States; Senators and Congressmen representing Florida and Louisiana; Florida's Governor-elect Farris Bryant; members of the Florida Sugar Committee when appointed by Bryant; the President of the Chamber of Commerce of Louisiana; and the President of the American Sugar Cane League of Louisiana," Harllee added.

Available Now - - -

Extra Large Trees For That Colder Location

Larger trees planted this fall or next spring will be in better condition to withstand the onslaughts of Ol' Man Winter. They also make excellent replacements for storm-damaged trees as they will come into bearing much earlier. We now have these large trees available in most varieties —write or call us about your needs.

We were the first nursery to participate in the Citrus Budwood Registration Program, we can therefore offer you the widest selection of Registered Psorosis-free and Xylopsorosis-free citrus stock.

Our 36 years experience enables us to understand better the customer's problem and to produce the **SUPERIOR** trees desired by the Citrus Industry. Let us show you, come inspect our nursery.

For the **BEST** Registered or regular stock call or write

WARD'S NURSERY, INC.

DAY PHONE GL 3-4657
NIGHT PHONE GL 3-4433

P. O. BOX 846
AVON PARK, FLORIDA

MINUTE MAID TO SPONSOR TOURNAMENT OF ROSES PARADE

Minute Maid Frozen Concentrates and Hi-C Fruit Drinks will again sponsor the telecast of the Tournament of Roses Parade from Pasadena, California, on January 2. The 1961 telecast of the 72nd Annual Rose Parade, the nation's oldest and most famous floral spectacular, marks Minute Maid's seventh consecutive year of sponsorship and Hi-C's third.

"The parade will be telecast in color and in black and white over 169 NBC stations reaching more than 12,700,000 homes," said Howard G. Dick, Vice President of Sales for Minute Maid Corporation.

Classified Ads

NURSERY STAKES — Galvanized Steel. New 3/16" x 30" (Standard). $35.00 per 1,000 while they last. Cauthen Grove Service and Farm Supply, Leesburg, Florida, Phone ST 7-3516.

IMMEDIATE DELIVERY, extra fine quality citrus trees, large size for resets. 2500 Pineapples, 400 Hamlins, rough lemons. Booking orders now 7M Queens June 1st, 15M Valencias, 10M Pineapples, 10M Queens rough lemon, 4M Pineapples, 3M Hamlin sour orange fall '61 or winter. WADE H. WARDLAW, Phone 3812, Box 83, Frostproof, Fla.

QUALITY CITRUS TREES For Sale. Ready for planting now. Hamlin, Valencia, Enterprise Seedless, Navels, Parson Brown ½" to ¾". All on Sour Orange Root Stock. Certified Free of Burrowing Nematode. OSCAR F. GREENLUND, Box 218, Pierson, Florida. Phone 3921.

NEW SEEDLESS ORANGE EARLIER THAN ANYTHING KNOWN

GROWERS desiring to build a highly profitable early fresh-fruit business might do well to investigate.

Interested only in deal with large responsible grower on partnership basis controlling this most promising fruit ourselves. Opportunity for honest, fair individual.

Passes well over Maturity Code Analysis by September 17th. Acids 73; Solids 11.20; Ratios 14 to 17 to 1, by October 15th; Gallons juice per box 6.00 plus. Beautiful fruits; prolific; Seedling type **disease-free.** Excellent flavor.

Control of this most promising fruit means high premiums.

ROYAL PURPLE CITRUS RESEARCH NURSERY
1224 Palmer St., Orlando, Florida

CITRUS PLANT BREEDING A FASCINATING AND PROFITABLE VENTURE FOR ALL ENTERPRISING CITRUS GROWERS

(Continued from page 21)

to wait and carefully examine the fully-matured fruits after they attain full color. This may be yellow or it could well be a beautiful red peel.

The parent seedling hybrid of the type is now 10 years old, differing in characteristics from either grapefruit or orange trees, and has never yet flowered.

AVAILABLE FOR IMMEDIATE DELIVERY: REGISTERED HAMLINS ON CLEO, a limited quantity of non-registered Hamlins on sour and Pineapples on lemon. All other common varieties, REGISTERED psorosis and xyloporosis free, or non-registered, on lemon, sweet, Cleo, or sour rootstock available for Fall of 1960 and Spring of 1961. Fancy varieties, both REGISTERED and non-registered also available. Write for prices. GRAND ISLAND NURSERIES, P. O. Box 906, Eustis, Florida.

ADAMS CITRUS NURSERY
Popular Varieties on Rough Lemon, Sour Orange Rootstocks. Large Sizes For Resets.
Grown on Virgin Land
ORDER NOW FOR FALL 60 SPRING 61
Winter Haven
Off: CY 3-5672 — CY 3-6075
Haines City
Nursery — HA 2-4055

FOR REAL SERVICE in BUYING or SELLING Citrus Groves, in all sections, Contact me. Specializing in Citrus for over 25 years. Dwight H. Mangum, Realtor, P. O. Box 2544, Lakeland, Florida.

Ready to Plant Now!

- **4,000 Hamlins**
- **3,000 Navel**
- **3,000 Marshseedless**
- **3,000 Valencias**
- **7,000 Pineapple**

ALL ROUGH LEMON

Plant Board Inspected
Free of Nematodes

Call or Write

A. M. HARVEY
102 Avenue H, S.E.
Winter Haven, Fla.
or Phone CY 3-6108
FIRST COME - FIRST SERVED

Navel grapefruit seedlings might produce, has as yet never been possible, since no seedlings have ever fruited except this one outstanding Tangerine-grapefruit seedling type, and that only as a top-worked scion.

SPECIAL!
SCARCE REGISTERED PSOROSIS-FREE STOCK

3,000 Pineapple on rough lemon

8,000 Hamlin on rough lemon

Up to 1¼" caliper, $2.00 each. Orders of 500 or more delivered free. Inspection invited. Call for appointment, GLendale 3-4657 day or GLendale 3-4433, night.

WARD'S NURSERY, INC.
BOX 846 AVON PARK, FLA.

GROVE PROBLEMS?

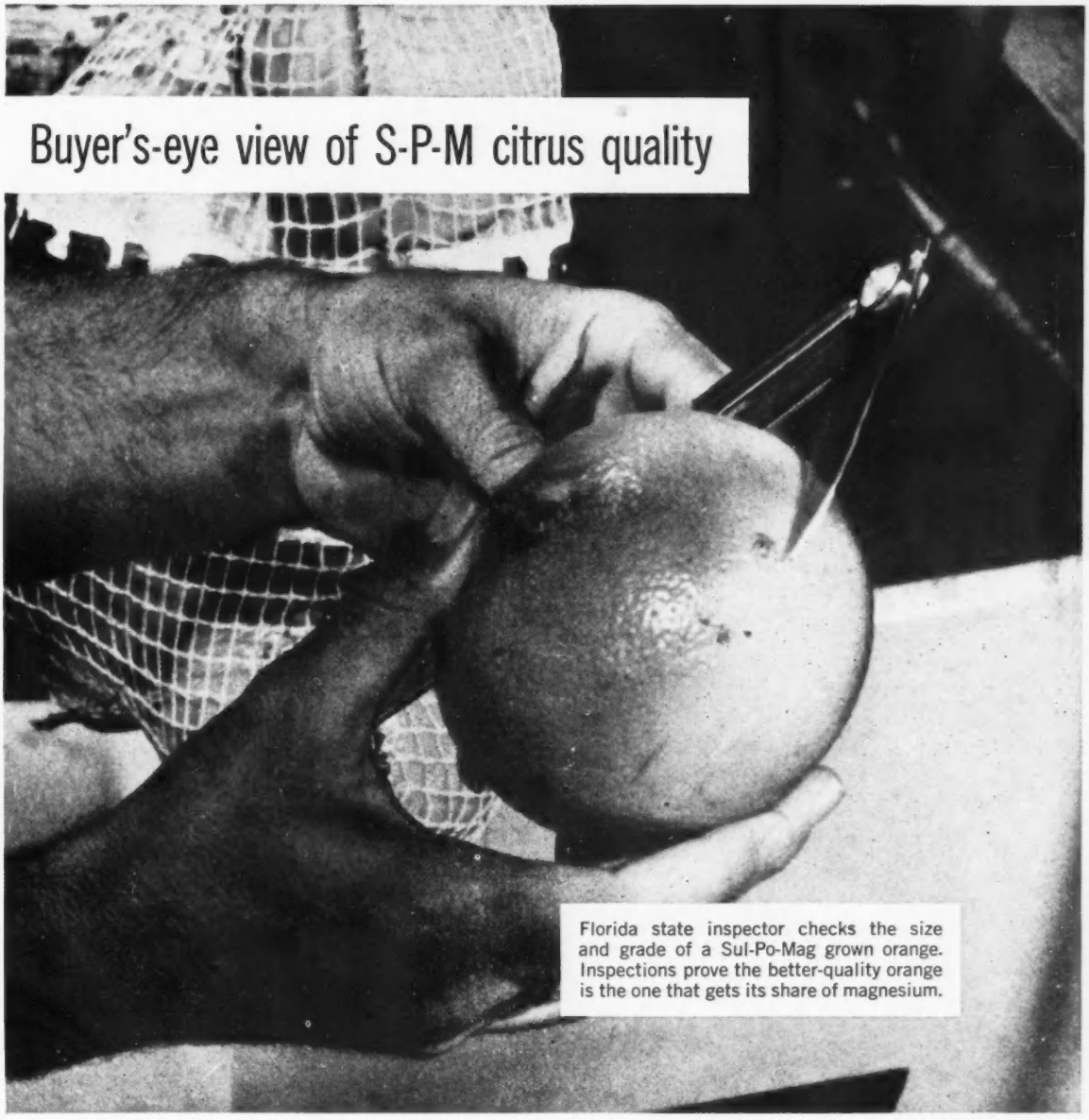
Consult Dr. Wolf to bring back and keep your grove in top condition. Phone or write for free details.

DR. WOLF'S LABS
2620 Taylor St.
HOLLYWOOD, FLORIDA
Phone: WA 2-2808

Hamlin, valencia, pineapple and temple oranges; orlando and mineola tangelos for spring or summer planting. Nemotode free. Prices on request. Crescent Farms, P. O. Box 890, Bradenton, Florida. Telephone 2-3821 or 2-7004.

GENUINE PARTS
GUARANTEED SERVICE
POUNDS TRACTOR CO.
Your Case and Hardie Dealer
Two Locations:
3rd & Ave. "D" — S. W. WINTER HAVEN
102 North Rest Ave. AVON PARK

Buyer's-eye view of S-P-M citrus quality



Florida state inspector checks the size and grade of a Sul-Po-Mag grown orange. Inspections prove the better-quality orange is the one that gets its share of magnesium.

better color...thinner rind...more vitamins in the juice

That's what buyers see in samples picked from trees nourished by Sul-Po-Mag. Citrus trees "like" what they get from Sul-Po-Mag — water-soluble magnesium that produces fruit of exceptionally good quality. Tests prove that, with adequate magnesium, rinds *are* thinner . . . color is brighter (inside and out) . . . and sugar and vitamin content of the juice are greatly increased. With Sul-Po-Mag, yields are greater too. Water-soluble Sul-Po-Mag stays in grove soils all season long . . . slowly releases magnesium nutrition for better tree health and higher fruit quality. Next time you buy fertilizer, ask for Sul-Po-Mag.

S·P·M PREMIUM

Quality fertilizer containing a combination of readily available magnesium and sulphate of potash obtained from *Sul-Po-Mag*

This seal is your assurance of extra-value fertilizer

AGRICULTURAL CHEMICALS DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

ADMINISTRATIVE CENTER: SKOKIE, ILLINOIS

IMC

PRODUCTS FOR GROWTH®

®TRADEMARK

SPM-11-01

We Invite Comparison...

. . . . It has been the unvarying policy of this company from the first day of its existence to constantly seek to manufacture the finest fertilizers it is possible to produce . . . no expense has been spared to bring about the realization of this objective . . . and as a result only the very finest proven ingredients, and the most modern methods of manufacturing are always characteristic of our fertilizers.

. . . . We make this statement with no desire to belittle the products of other manufacturers, but simply to present the facts to those who grow Florida's fine citrus and vegetable crops. . . . . Many of the state's most successful growers have been using our fertilizers constantly throughout the years and have demonstrated for themselves the truth of our claims for producing fine fertilizers which result in their fine crops.

. . . . So we invite comparison, and suggest that if you are not already a user of Lyons fertilizers, that you set aside a plot, either large or small, in your grove or field and use our fertilizers exclusively in such a test plot . . . and let the results govern your future purchases.

. . . . When you figure the cost of your fertilizers, we recommend that you base any comparisons upon the basis of your per box cost of fertilizers, rather than upon your total fertilizer expense.

You will also find our Field Service Men highly competent to advise with you on your production problems . . . and always willing to serve you.

LYONS FERTILIZERS Produce MAXIMUM CROPS Of FINEST QUALITY

Lyons Fertilizer Company

Phone 43-101

TAMPA FLORIDA